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No. 1
VOL. XXIX

75 E. Wacker Drive,
Chicago, U. S. A.

Best wishes for a Very
Merry Holiday Season
to Our Friends the Veterinarians
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D. M. Campbell, Editor A. T. Kinsley, Associate Editor
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NRA MEMBER U.S. WE DO OUR PART

Acetamide, a compound made from acetic acid and ammonia, has a wider range of solvent power than any other known substance.

Birds may have a development of breast muscles, for operating their wings, equal to one-fifth of their total weight.—*S. N. L.* 24:659.

Medical records were kept in the temple of Aesculapius in Greece, case histories being registered on marble tablets.—*S. N. L.* 24:659.

While laboratory tests show that a tiny fraction of an ounce of mustard gas in the lungs will kill a man in a minute, in actual field use it takes about two tons of this gas to produce a single death.—*S. N. L.*, 24: 652.

Iodine was discovered in 1811, in kelp or seaweed, by Bernard Courtous, a manufacturer of saltpeter, near Paris. Sir Humphrey Davy, somewhat later announced the substance as a new element and gave it the name iodine. Coindet first put iodine to a medicinal use, in the treatment of goitre; although burnt sponges and poultices of kelp had been used impirically in the treatment of goitre for a long time.

Buy Christmas seals

Christmas Seals help prevent, find and cure tuberculosis all the year round. Use them generously on all Christmas packages, gifts, cards and letters; and let your business correspondence proclaim "Good Health to All."

—*Fight tuberculosis.*

During the year 1932 more than 15 million persons received medical care in hospitals in the United States; a patient was received every four seconds, day and night. —*Hygeia.*

Cold cream is not as new as one is likely to believe. Galen, the celebrated Roman physician, is credited with its invention nearly eighteen hundred years ago; today, cosmetic chemists use the same formula with but slight modification.—*Hygeia.*

A three-months-old puppy in a Civilian Conservation Corps camp in Los Angeles County, California, bit or otherwise exposed 72 persons to rabies, all of whom took the Pasteur treatment. The dog later died of rabies.

The oldest written record of a horse show known is in a book written in England in 1174.—*S. N. L.* 24:659.

The last census showed that 86 out of every 100 farms in this country were operated entirely with horses or mules.—*S. N. L.* 24:659.

Suet is a good base for the feeding of birds during the winter, since it furnishes the heat producing substances they need.—*S. N. L.*, 24:654.

The Code of Fair Competition for the Retail Trade excludes from its provisions "The dispensing of drugs, medicines and medical supplies by a physician, dentist, surgeon or veterinarian in the legitimate practice of his profession."

Blood transfusion was performed as early as 1667, but the importance of matching the blood was not then realized, and the treatment was so frequently fatal that the French parliament prohibited the practice. —*S. N. L.* 24:657.

Orr points out that in districts where, owing to lack of iodine in the soil, the incidence of goitre in man is high, there is always a correspondingly high number of cretinoid idiots. In Switzerland, for example, there are said to be, outside of asylums, over 50,000 cretins or imbecile dwarfs, recognizable at sight, but Swiss medical authorities agree that where iodide salt is fed to the mother during pregnancy the offspring are born normal in body and mind.

Medicine becomes a science when specific therapeutic measures are used to combat the symptoms of disease, and as far as possible, to ameliorate their pathological or bacteriological causes—a science perhaps not as exact as in many other fields, but requiring greater skill because it is dealing with the animate, showing constant variations and idiosyncrasies, rather than with stable, inanimate substances.—*Pharmacal Advance.*

The latest estimate of deaths due to the World War places military deaths at 13,000,000, and civilian deaths at over 28,000,000.—*S. N. L.* 24:650.

Purifying gland secretions until they will form crystals, an accomplishment of modern chemistry, is one of the greatest aids that the medical art has received in recent years. It enables the physician to gauge his dose exactly instead of estimating it, it makes possible the introduction of drugs directly into the blood stream for practically instantaneous effect, and in many cases it eventually leads to the synthetic production of the same or even better principles at lower cost.—*S. N. L.* 24:649.

E. E. Tyzzer of the Harvard Medical School, announced at the autumn meeting of the National Academy of Science, the production of a vaccine that is successful in the prevention of blackhead in turkeys. Doctor Tyzzer succeeded in propagating the *Histomonas meleagridis* on artificial media. When thus grown, the organism is in time attenuated until it will not produce the disease, but does bring about immunity in young turkeys. Doctor Tyzzer, however, held out little hope of immediate availability of the vaccine, stating that "There are, at the present time, practical difficulties that prevent the adoption of the procedure for commercial purposes."

Steinach has decided, as a result of studies carried out in the Veterinary School in Zurich, Switzerland, that the injection of hormones is a satisfactory substitute for his famous operation of gonad transplantation, and of course is far less expensive. Prof. Walter Frei and Doctors Staheli and Gruter, three Swiss veterinarians colaborated with Prof. Eugene Steinach in this work. Although this is perhaps the first controlled experiment to demonstrate that the hypodermic injection of hormones is as effective as gonad transplantation, veterinarians in many parts of the world have been using hormone injections for this purpose for some time.

Association of Veterinarians in Small Animal Practice

AFTER considerable delay, the organization for veterinarians operating pet hospitals, started at the A. V. M. A. meeting in Chicago, is getting under way.

There was much enthusiasm for such an organization when the matter was proposed in Chicago. At the meeting called to consider the advisability of organizing nearly 200 attended and seldom has a group more in earnest assembled. Unfortunately, no one was prepared to state clearly the objectives of the association or to offer a concrete plan for achieving them. Manifestly, all were in favor of measures to raise the average standard of animal hospitalization, and believed this end could be attained by cooperation among those rendering such services. But much more or less irrelevant discussions and many uncalled for assertions aroused distrust in the minds of many and alienated a few from all sympathy with the project. This, with a total disregard of parliamentary procedure and the selection of two or three sets of temporary officers, flustrated the accomplishment of tangible result at the time.

THE idea is a good one and deserves to succeed. A few of those present at the attempt at organization refused to be discouraged by the unpropitious start and set to work to bring about such an organization through correspondence and committee meetings. A statement of objectives has been agreed upon, a name and officers for the new association selected and the work of enrolling additional members set about.

The name of the new organization is: American Animal Hospital Association.

Briefly, its objectives are:

To improve the veterinary service and facilities available for the hospitalization of small animals; to protect and promote the professional interests of veterinarians engaged in the hospitalization of small animals; to improve the standard of instruction for veterinary students in cynology and allied subjects; to desseminate useful information concerning the health of animal pets among the owners of such animals; to establish and maintain a high standard of equipment, methods and personnel in the hospitalization of small animals and supply owners of such animals with accurate information as to the availability of such facilities.

The officers selected for the ensuing year are: M. L. Morris, Stelton, N. J., President; D. A. Eastman, Moline, Ill., Vice President, and A. R. Theobald, Secretary-Treasurer. It is proposed to hold the first meeting in Cincinnati next April and another meeting at the time of the 71st annual meeting of the A. V. M. A. in New York City next August.

THE list of officers selected will go far to allay any anxiety concerning the good intentions of the organization. They are well and favorably known and have the confidence of all. However, the association still needs, as it needed when organization was first attempted, a clear straight forward statement of the qualifications for membership, what it purposes to do and how it purposes doing it.

In the constitution and by-laws for the new association, which has been adopted by the organization committee, both institutional and individual memberships have been provided. Only the former are entitled to vote, serve on committees or hold office. The annual dues for animal hospitals is $60, and of individual membership $5 a year. Hospital membership

is limited to approved institutions and individual membership to members of the A. V. M. A. in state, federal or school employ or commercial work; others (practitioners and laymen) by special permission of the executive board. The obvious purpose of individual memberships being to raise revenue, the limitations upon this class of membership is not obvious.

An extraordinary amount of authority is concentrated in the office of president and about all power that is left is vested in an executive board of four members elected for a term of four years, and only a plurality is required to elect.

THE same indefiniteness exhibited in the preamble is conspicuous throughout the constitution and by-laws. Thus, a hospital to qualify for membership must be a "substantial building," must have "good ventilation" and an appearance that will "reflect credit." Nothing specified as to cubic feet of air space per animal or time required for a complete change of air in the room or building. Thinking of the days before Edison, it is provided it must have "natural light." The lighting demonstrations of the "Century of Progress" go for naught. Sunlight that passes through window glass becomes essentially artificial light with the disadvantage that it is largely uncontrollable as to amount and direction and contains much less of the health-promoting short rays than may be had from produced artificial light which is fully controllable as to amount and location. "Floors that make possible cleanliness" should afford leeway to the taste of all. Two yards inside or outside for exercising are required, size not specified. There must be, however, facilities to hospitalize 15 or more patients in "separate and distinct" compartments; and at least seven rooms in the hospital; a graduate, licensed veterinarian in daily attendance and a sufficient number of nurses or trained attendants.

Five standing committees are provided — membership, hospital buildings, equipment and methods, program, resolutions and policies, and public relations. They "shall function in a business-like manner." This and the "duty of the executive board to require the submission of evidence at least once yearly, by member hospitals, regarding the standards that these hospitals are maintaining" offer about the only clues to the operation of the association. It would seem somewhat difficult to carry out the objects of the association on such a basis. Sixty dollars yearly is a sizeable fee for a veterinary association and when first enthusiasm wears off, members will ask themselves what they are getting for it.

THE foregoing criticism is not made in any spirit of fault-finding, but to point out the need for further study of the subject by all interested to the end that at the April meeting a more definite program may be agreed upon. It seems inevitable that for general approval, some of the following questions among others must be answered in somewhat definite or at least measurable terms:

1. Will minimum standards be set for animal hospital buildings, equipment and personnel? Will they differ for small and large cities?

In advertising and other business matters, will the observance of the canons of good taste and professional ethics be required?

Will the relative number of professional and non-professional workers in the establishment be regulated and will certain duties be excluded from the latter?

Will filing a detailed schedule of prices, accessible to all members and to patrons of the particular hospital, be required?

Will the dues be uniform or graduated according to the business done (and inferentially the benefit received) and will they be sufficient in amount for the organization to operate upon and enable it to ascertain by personal inspection if members are maintaining the required standards and practices?

Will members be bonded as to fiduciary responsibilities? Will insurance against

suits for malpractice be carried for members?

What measures tending to increase the patronage of member institutions is it proposed to carry out *immediately?*

What voice will a member have in establishing the policies and in carrying them out?

IT MAY not be needful or even desirable to attempt to settle details of operation at this time. It is better to adopt but the broadest outline in the beginning and leave all details for decision after the membership roll is somewhere near complete that many members may have a voice in it; but before joining an association, even one the objects of which are so desirable as this, one wants to know some little about it; at least as much as will be revealed by answers to the foregoing questions. It cannot be expected that a full measure of confidence in, and support for, the new association can be had for less. If there ever was any doubt as to the truth of this, it was dispelled at the Chicago meeting.

PORTAL OF CERTAIN VIRUS INFECTIONS

Simon Flexner of the Rockefeller Institute for Medical Research reports as a result of his study of poliomyelitis in Rhesus monkeys, that the virus of this disease (infantile paralysis) may enter the system through the hair-like processes of the nerve cells that extend into the layer of mucous on the Schneiderian membrane. The virus then makes its way within the nerve fibers to the brain, and from there extends to the spinal cord and efferent motor nerves. Living thus within the nerve fibers, the virus is but slightly exposed to blood and lymph and is but little or not at all effected by protective substances formed within the body, since they cannot reach it effectively.

While Doctor Flexner's study was confined to the virus of poliomyelitis, he thinks his findings may have an important application to other viruses effecting principally the central nervous system. Rabies and equine encephalomyelitis are two such viruses that concern veterinary medicine and both are characterized by considerable difficulty in experimental inoculation by injection into the tissues.

In view of the difficulty that research workers dealing with rabies have had in producing the disease by other than subdural inoculation, Doctor Flexner's discovery may be of advantage. Possibly rabies can be communicated more certainly by nasal insufflation of the virus than by hypodermic injection.

HOURLY VARIATIONS IN FECAL EXAMINATIONS

English sparrows[1] (*Passer domesticus*) are practically 100 per cent infected with coccidia belonging to the genus *Isospora,* which is distinctly different from the *Eimeria* involved in poultry coccidiosis. It is usually believed that the "spores" of the coccidia (the oöcysts), which transfer the infection from one host to another, are freed into the intestinal cavity more or less continuously and are, therefor, to be found in approximately equal numbers in the various fecal samples which may be examined throughout a 24-hour period. In this study a different condition was demonstrated for the sparrow coccidia. Hourly microscopic examinations during the 24 hours demonstrated that a daily peak of oöcysts occurs between 3:00 P. M. and 9:00 P. M. Heavily infected birds often show no oöcysts at all during the forenoon, only to exhibit their infections with great numbers of oöcysts during the late afternoon. This daily periodicity was found to hold true also for coccidial infections in a number of captive birds in a zoological garden. Reversal of the peak to 3:00 A. M.-9:00 A. M. was accomplished by keeping sparrows under artificial conditions of light at night and darkness during the day. This periodicity in oöcyst-production in the coccidia appears to be a phenomenon similar to the periodic multiplication in bird malaria.

[1]**Boughton, Ph.D., Donald C. Diurnal Gametic Periodicity in Avian *Isospora*, The *American Journal of Hygiene*, Vol. XVII, No. 1, 161-184. Abstracted by the author.**

The Relation of Disease in Animals to Public Health—The Milk*

By J. G. HARDENBERGH,
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MILK occupies a singular position in its relation to the public health. It is our most valuable single food, nearly perfect in its content of essential nutrients, and an indispensable part of the dietary especially of babies and children. More recently, milk has been placed in a leading position in that class of foods designated and distinguished by the biochemist as "protective foods."

On the other hand milk may under uncontrolled or careless conditions serve as an excellent vehicle not only for the transmission of certain disease viruses to man but even on occasion for their propagation.

Although there are twenty or more communicable diseases of cattle, only a few of them relate directly to the public health. Of these should be mentioned bovine tuberculosis, foot-and-mouth disease, Bang's abortion disease, and possibly rabies; also streptococcal infections such as mastitis and, occasionally, other temporary udder infections that may result in cases of food poisoning or gastro-enteritis. Although these diseases do constitute a certain danger to human health, this is greatly reduced under present control of animal disease by livestock sanitary officials plus modern methods of producing safe and wholesome milk.

Bovine Tuberculosis.—Milk can become infected either through tuberculous lesions in the udder or by contamination with infected feces. We know that humans, especially children, can be infected with bovine tubercle bacilli; that the tuberculin test will identify tuberculous dairy cows in an efficient and dependable manner and permit their removal as sources of infection. We know that adequate pasteurization of milk will kill bovine tubercle bacilli; that the tuberculin test plus pasteurization of all milk, except certified, is a requirement in many communities today.

If the bovine type of tubercle infection in man continues to occur in the United States, it will be largely a rural problem associated with those instances in which families or small communities use milk from untested cattle and where pasteurization is not carried on. The basic solution rests in the eradication of the bovine disease. This is being accomplished in an efficient manner through the operation of the national cooperative program engaged in by the State and Federal Bureaus of Animal Industry since 1917. Certainly our rural population is entitled to protection. Our cities with their highly developed health activities are capable of looking out for themselves but we must consider the welfare of the people living beyond the influence of such organized communal agencies.

Foot-and-Mouth Disease.—Foot-and-mouth disease does not exist in the United States today and consequently is not a public health problem. On those rare occasions when it does gain entrance, it must be remembered that the virus may infect man through the ingestion of raw milk or milk products. While it is not very infectious for man, children seem to be more susceptible than adults.

Bang's Abortion Disease.—Undulant fever was first recognized in Illinois in 1928 when one case was reported. During the next year 37 cases were reported and then 63, 124 and 76 in the three succeeding years. The first half of 1933 brought a total of 42 reported cases in this state. Reported cases

*Read before the Fourteenth Annual Illinois Veterinary Conference, College of Medicine, University of Illinois, Chicago, October 16-17-18, 1933.

of undulant fever may be on the increase although the U. S. Public Health Service lists 1,408 cases in 45 states for 1932 compared with 1,545 for 1931. The number attributed to milk-borne infection is not given but the opinion that about one-half of the cases are due to dairy products may be tenable. Until more definite answers can be given to some of the questions concerning undulant fever, pasteurization must be the means of protecting man from milk-borne infections or, in certain instances, elimination of Bang's disease from the dairy herds.

From the reports of cases of undulant fever that are ascribed to infected milk and dairy products, it appears that many cases merit better epidemiological investigations. The mere coincidence of a given case with a raw milk supply from a herd of cattle containing reactors to the agglutination test may be strong circumstantial evidence but it is hardly sufficient evidence on which to base final judgment.

Rabies.—Practically all of the evidence with respect to the transmission of rabies through milk is negative in character. In cows exposed to rabies through the bites of rabid dogs, it is probable that the milk is not infectious until symptoms of the disease develop. Thereafter, it is unlikely that rabid cows could be milked due to their excitable condition, and this would automatically exclude virus-infected milk from the supply.

Streptococcus Infections.—The significance of streptococci in milk has received the continued attention of milk hygienists and investigators. It is a question closely interwoven with bovine mastitis because, whenever milk supplies are found carrying large numbers of streptococci (other than lactic) investigation will reveal the presence of streptococci mastitis in the dairy herd sources. In discussing the streptococci of milk with reference to human health, Brown says:

"Streptococcal bovine mastitis is very prevalent. It appears in all herds from time to time and is present most of the time in all herds of more than a few cows. The streptococci found in bovine mastitis may be hemolytic or non-hemolytic but there is no evidence that those found in most cases of mastitis are pathogenic for man.

"The evidence at hand indicates that milk-borne epidemics of streptococcus infection in human beings are caused not by bovine streptococci but by human strains which may become implanted into the udder of the cow. It is not a common occurrence but is sufficiently common to cause many disastrous epidemics and to demand the constant vigilance of those engaged in milk control work. Milk from cows with mastitis should not be used for human consumption and no person with a hemolytic streptococcus infection should be allowed to handle the udder of a cow."

The health official, in his epidemiological work on streptococcus infections, must proceed with caution. Whereas, on the one hand, he should not be required to fasten a specific label upon the organism found associated with milk-borne septic sore throat or scarlet fever, neither should be satisfied with the mere finding of "hemolytic streptococci" in the milk supplies involved; at least, he should be able to say whether or not the strains found in the human cases and in the cows are identical insofar as laboratory tests will permit.

Mastitis.—In addition to the foregoing considerations of streptococcal infections and mastitis, the significance of mastitis when due to organisms purely bovine in type is important. Milk from cows having mastitis, whatever the cause, is not fit for human consumption but the problem still remains to educate dairymen to the early recognition of mastitis and the exclusion of all abnormal milk. Too many dairymen still are inclined to exclude the milk only of those cows that have reached acute stages of udder disease.

Some feel that a few streptococci may be present normally, but it seems to me that this is an indication of the existence of latent foci of infection. If this is true, the practical question, from a public health standpoint, is "How much infection must be present before the milk becomes unsafe for human consumption?" Probably we can all agree that when there are a large number of streptococci, with or without an excessive number of leucocytes, the milk is "potentially unsafe" and should not be used.

If the milk is pasteurized it is probably

safe, although we should not lose sight of the possibility of putting pasteurized milk in bad repute if we are too ready to allow delivery to the pasteurizing plant of milk which we would not want to recommend for human consumption without pasteurization.

Statistical Summary—Other Milk-Borne Diseases

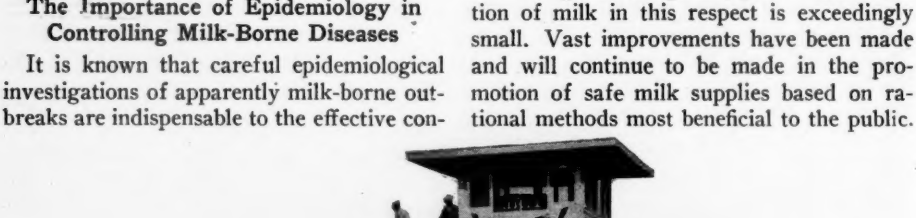
In 1932 there were reported 33 epidemics of disease carried by milk with 642 cases and 28 deaths. In all but 2 epidemics, the milk supplies involved were raw; 2 epidemics were attributed to pasteurized milk but in these instances investigation revealed that there were irregularities in the process indicating inadequate pasteurization.

In making a summary of milk-borne epidemics of various diseases for the past 10 years, it is noted that the average yearly ratio for all diseases (typhoid fever, septic sore throat, scarlet fever, etc.) for the 10 years in 39 cases and 1.3 deaths per epidemic. Typhoid shows an average of 20 cases per outbreak or just about one-half that of the average for all diseases, whereas septic sore throat shows an average of 155 cases per outbreak or 4 times the average. Typhoid fever contributes more than two-thirds of the epidemics, only one-third of the cases, but three-fourths of the deaths, whereas septic sore throat contributes only about one-tenth of the epidemics, almost half of the cases and only one-sixth of the deaths.

The Importance of Epidemiology in Controlling Milk-Borne Diseases

It is known that careful epidemiological investigations of apparently milk-borne outbreaks are indispensable to the effective control of diseases transmissible through milk. If epidemiology be defined as "the sum of what is known regarding epidemics," then it may be assumed that too little is known about some disease outbreaks. Those of us who are interested in the control of milk-borne disease must appreciate the necessity of knowing all the scientific facts and other pertinent data relating to communicable diseases in general and how to go about the important task of learning when they occur, how they occur and why, and through what vehicles they may be transmitted. Lack of this or of fundamental training and experience may lead to erroneous conclusions; the result—inconvenience and unwarranted alarm to the public on one hand and injustise to the milk industry on the other.

In conclusion: Whereas every effort should be made to promote the production of milk supplies with the highest possible factor of safety, the role of milk as a potential factor of disease should not be subject to overemphasis nor distortion. There is an important question of principle involved as to how far we may properly go in arousing public opinion by confronting milk consumers with a spectre of fear regarding the safety of milk supplies. Wholesome milk is an indispensable part of our dietary and is now recognized as one of the best "protective" foods to prevent nutritional deficiencies. Although the transmission of any amount of disease through milk is to be guarded against, yet the contribution of milk in this respect is exceedingly small. Vast improvements have been made and will continue to be made in the promotion of safe milk supplies based on rational methods most beneficial to the public.



Johne's Disease*

By B. A. BEACH,
University of Wisconsin.

JOHNE'S disease is one that is not at all widespread in Wisconsin or in any part of our country at present. It does occur, however, and as the years go by it will become more and more common and will place a greater tax on the cattle industry unless some consideration is given to it by those engaged in the raising and sale of cattle. It is not a new disease, but one which until recent years was confounded with other diseases. Its cause was discovered in 1895. The disease was first reported in this country (by Pearson) in Pennsylvania in 1908.

The successful fight against any transmissible disease necessitates some means of detecting it at such an early stage in its development that the affected animal may be removed before the producing organism has begun its exit from its body.

The disease affects cattle and, in rare instances, sheep and goats. The affected animals lose flesh very slowly until they become virtually walking skeletons. The unthrifty condition of animals, in spite of abundant feed, is occasioned in part by this disease. Tuberculosis is another cause of the condition that makes the common English terms, "piner" and "waster" fitting ones. The word "canner," referring to the use which is made of the meat in the packing houses, is the more common American term applied to emaciated animals. The progress of Johne's disease is so slow and often so intermittent that its contagious nature is usually not recognized since one usually thinks of a transmissible disease as progressing rapidly to death or retrogressing quickly to recovery.

Johne's disease is found in all the countries of western Europe, in India, South Africa, and probably in all the lands to which European cattle have been brought in any numbers. It has been reported from 36 of the states.

Little is known concerning its prevalence in the various countries above mentioned. In Denmark 3.5% of the total value of the cattle insured by one company was paid yearly for losses due to Johne's disease. Its prevalence in the Jersey herds of Denmark caused Bang to say that the future of this breed in Denmark will be menaced unless the disease is eradicated from the herds of that country. It is estimated that 1% of the cattle of England are affected. In the Birmingham abbatoir six cases are found on the average in each 1,000 animals. No definite data are available as to the prevalence of Johne's disease in Germany, Switzerland, France, Holland, and Belgium. The brief reports regarding the disease indicate that it is a factor of considerable importance in the livestock economics of these countries.

Nothing can be said with assurance regarding its prevalence in this country and in Wisconsin. It is certainly much less prevalent than in Europe, but probably more common than any one suspects at present. A more exact idea of its prevalence can be obtained only as the practicing veterinarians and the farmers become able to recognize it from its characteristic symptoms. Only a small fraction of the herds in any part of the country is infected. The disease is spreading slowly, and now is the time when its further distribution can be easily prevented.

The fact that a disease is not prevalent is not an indication that it may not be an important economic factor as regards the infected herd. Information concerning the losses occasioned by the disease is meager.

Eight of the herds belonging to Colleges of Agriculture in this country are affected. One, a herd of 207 animals, lost 27 head in 18 months. O. Bang reports the loss of 22 animals from a herd of 150 in one year. It is believed that the losses in some parts of England occasioned by Johne's disease are greater than those caused by tuberculosis. The available evidence indicates that the

*Presented at the Fourteenth Annual Veterinary Conference, College of Medicine, University of Illinois, Chicago, October 16-17-18, 1933.

owner of an infected herd will have a considerable annual tax placed on him by the disease.

The most striking symptom of Johne's disease is the gradual loss of flesh. This may continue until the animal becomes a mere skeleton. The eyes remain bright, but become sunken, due to the loss of intraorbital fat. The appetitie is not impaired, but the feed seems to have little nutritive effect, due probably to the changes which take place in the bowel wall. There is commonly no fever, the milk flow is reduced, and finally ceases altogether.

The other characteristic symptom is a diarrhea, which appears and disappears to appear again sooner or later. In the later stages of the disease, the diarrhea may be constant, or it may be entirely absent.

There are numerous causes for emaciation in cattle and also many causes for diarrhea. However, when a marked and persistent loss of flesh is accompanied by an intermittent diarrhea in animals over two years old, Johne's disease should be suspected.

The progress of the disease is slow. Symptoms are never noted in less than six months after invasion by the causal organism. This means that the disease will rarely be noted in young animals. Heifers with their first or second calf are more apt to show symptoms than younger or older animals. The strain placed on the animal by pregnancy seems to accentuate the progress of the disease which may have been acquired in early life.

The period during which an animal may live after symptoms appear is often long. One of the animals of our experimental herd showed what were considered symptoms of a rather advanced case of Johne's disease at the time she was purchased. During the next two and one-half years, there was little change. The animal died two years and eight months after purchase. The long period of incubation, the change in condition from better to worse and back to better, both as regards loss of flesh and diarrhea, and the extended period in which decline is very gradual are likely to lead to the conclusion that some physiological disturbance is the cause of the condition rather than that an infectious disease is present.

The changes found in the tissues of an animal which has been shown to have Johne's disease by the test above referred to, or in one which has died from Johne's disease, are usually insignificant as compared to the physical condition to which the animal is reduced. In many instances the extent of lesions bears no relation to the emaciation or to the diarrhea that the animal showed. Cases of long standing may show very little evidence of the disease on post mortem examination, while in others the tissue changes are comparatively quite marked. It seems certain that this non-relation between the extent of lesions and the condition of the animal has caused many cases of Johne's disease to pass undetected by the examining veterinarian. The lesions of Johne's disease will rarely be discovered unless the intestine is slit and the inner wall examined. In the cases examined by us in which the lesions were insignificant, the organisms have been found by microscopic examination. The only characteristic lesion is the thickening of the intestinal wall. This may vary widely both in extent and degree.

The organism causing the disease belongs to the same group as do the human, bovine, and avian tubercle bacilli, and the organism causing leprosy. All of these organisms when stained show the common property of resisting the decolorizing action of acids. A property which is constantly used in examining sputum and tissues for them. They are called acid-fast bacteria.

There is no reason to believe that the disease is transmitted from herd to herd other than through the transfer of an affected animal. Animals may be infected and yet show no symptoms for many months. The seller may have no reason to believe that the animal is other than healthy and so is, as far as the individual animal is concerned, perfectly innocent. Until recently most owners of affected herds have not realized the contagious nature of the malady which was

causing them more or less continuous losses and were again perfectly innocent of any wrong in the sale of animals. At present it is feared that as much cannot be said for all breeders.

The history of a number of affected herds has been obtained with such completeness that the original source of infection could be traced. Without exception a purchase from an infected herd has been the origin of the trouble. The best protection of the buyer is inquiry concerning the general health of the herd, and concerning the nature of losses that have occurred, rather than inquiry concerning the individual to be purchased. A general statement regarding the health of the entire herd should be required by the purchasers at any consignment sale of cattle.

The diagnostic test for the disease on the individual animal will give some measure of protection, but is not equal to the protection obtained when the condition of the entire herd from which the individual came is known.

It is not believed that there is any danger from other than a rather prolonged association with diseased animals. In other words the danger of infection from cars, stock yards, and show pens is negligible.

The Johnin Test

The cultivation of Johne's bacillus in 1910 by Twort and Ingram of England made possible the preparation of a product called johnin, similar in the manner of preparation and effect on healthy and diseased cattle to tuberculin. On account of the difficulty in growing the Johne's bacillus it was not possible until very recently to prepare the diagnostic agent in quantities which would permit its free use in the examination of cattle. Methods of cultivating the Johne's bacillus have been so improved that considerable quantities of johnin are now available. It is prepared by growing the organism in a special beef broth. It requires from four to six months to obtain cultures from which a potent product can be made. The testing fluid consists of an extract of the bacteria. There is no possibility of the johnin ever producing the disease in the animals into which it is injected.

In examining cattle for Johne's disease it has not been found possible to use the methods now employed in making the tuberculin test. There are three types of the tuberculin test, the thermal, the intradermal, and the ophthalmic. It seems probable that some one of them may be applied to the johnin test when better ways of preparing johnin have been devised.

Results of Tests on an Infected Herd

Date	Reactors
June, 1917	5
November, 1917	4
February, 1919	6
June, 1919	3
November, 1919	4
June, 1920	4
December, 1920	2
June, 1921	0
June, 1923	1

Our results with the johnin test have not been such as to warrant our unqualified endorsement. That much infection can be eliminated by its use is true. We believe, however, that in badly infected herds it is a sounder economic procedure to recommend slaughter of the entire herd than to attempt eradication of the disease by the johnin test.

* * * *

Easy Parturition

The largest reindeer occur on the Island of Sakhalin off the coast of Siberia. The biggest male reindeer ever found in Sakhalin weighed approximately 450 pounds, nearly twice the ordinary weight of reindeers. Females weighing about 360 pounds have been found.—*S. N. L.*, 24:653.

* * * *

Ephedrine, discovered ten years ago, and used widely in nasal preparations, is obtained from a Chinese drug plant used as a cure-all in China for 5,000 years.—*S. N. L.* 24:659.

Lungworm in Foxes— Its Control and Treatment

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LUNGWORM infestation is one of the most important diseases of the fox-breeding industry. Each year its prevalence is steadily increasing, both in number of ranches involved and in the relative number of serious cases of the disease on affected ranches. Because of its insidious and chronic nature, fox farmers usually do not give lungworm trouble much attention until after it has become well established and has developed to be a permanent handicap to the most successful operation of their ranches.

Cause and Modes of Transmission

The lungworm most commonly found on fox farms in this country (*Capillaria aerophila*) is a white, slender worm, varying from 1 to 3 inches in length. It is usually present in the windpipe and its branches.

The worm is transmitted through eggs, which, after being raised from the lungs, are usually swallowed and then passed in the feces. With suitable moisture and temperature conditions the eggs undergo an incubation in which the embryo worm is developed within the shell. It is believed that foxes pick up this parasite in eating or licking substances or objects that are contaminated with the embryonated eggs. Through one means or another the eggs hatch and the larval worms eventually reach the air passages of the lungs, where they remain and grow.

Occurrence

Lungworms are more troublesome on old ranches than on new ones, largely because of the gradual accumulation of embryonated eggs in the pen soil. Occasionally, however, they may be exceedingly troublesome on ranches that have been in operation for only a couple of years. In such cases there usually is a history of bad rattlers, wheezers, or coughers that have been allowed to stay in the regular breeding pens instead of being moved promptly and kept in isolated quarters where they can not contaminate ground occupied by healthy foxes.

Poor drainage, wet weather, heavy soil, and shade tend to favor incubation of the eggs and are, therefore, conducive to the development of the parasite. As a general rule, lungworms are not troublesome on unshaded and well-drained ranches with a sandy soil or on those where the foxes are kept in clean and properly drained concrete or board-floor pens.

In our northern climate cases of lungworm-trouble rarely develop after freezing weather sets in. In fact, most foxes having the disease recover from both symptoms and infestation during the winter, particularly if it is a cold one with a heavy snowfall and little thawing weather. Nevertheless, after the snow melts in spring, the foxes again start picking up lungworms. Thus, this parasitic disease tends to run a seasonal cycle in the northern part of the United States, the foxes picking up infestation and developing symptoms in spring and summer and summer and early in fall and then recovering during winter.

Symptoms

Foxes lightly infested with lungworms, and even some of those moderately infested, usually show no noticeable symptoms. In some of the moderate and prac-

tically all of the heavy infestations, however, symptoms become apparent, consisting usually of one or more of the following: A wheeze, a rattle, rales, shortwind, or spawl of a deep husky or hacking cough. Since chasing and catching the animals tends to bring out these symptoms and make them more noticeable, this method is often taken advantage of as an aid in the detection of affected animals. In bad cases one or more of the following may also become manifest: Emaciation, anemia, weakness, discharge from the nose and sometimes the eyes, and an unthrifty pelt.

In most cases lungworm trouble tends to be chronic and insidious in nature, the symptoms developing gradually and remaining about the same for a few weeks to several months. Except in bad cases the animals seldom show marked distress or loss of appetite.

Acute cases, or those that develop rapidly and soon terminate in death, are occasionally encountered. In such instances there generally is involved either a heavy infestation picked up within a short time or a complicating bacterial infection.

Lesions

Light and moderate infestations usually are associated with no apparent gross lesions. Chronic catarrhal inflammation of the windpipe and its branches, together with more or less abundant phlegm-like exudate in the air pasages, is encountered in some moderate and nearly all heavy infestations. It is this exudate that is responsible for the characteristic wheeze or rattle so common in lungworm trouble. Chronic bronchial pneumonia is rather common in bad cases of long standing. The inflammation and the symptoms produced by the lungworms may persist for some time after the animal has recovered from infestation.

Care and Treatment of Pens

The feces of all foxes should be disposed of each day throughout the year. This is essential to help reduce contamination of the ground and prevent the pens from becoming a troublesome source of worm infestation. Pens should be well drained. It is advisable to have drainage ditches around every pen so as to prevent the dissemination of lungworm eggs by water flowing from one pen into another. Heavily infested foxes or those showing apparent symptoms of lungworm trouble should not be allowed to remain in breeding pens any longer than is absolutely essential. Such animals should be promptly removed to isolated quarantine pens, where they will not have opportunity to infest ground that is used by healthy stock. It requires only a short time for a heavily infested fox so to contaminate a pen that practically all susceptible animals kept in it will likewise become heavily infested with lungworms.

Once a pen becomes a troublesome source of lungworm trouble, it is advisable to abandon it until after it is given a treatment that will remove or destroy the major portion of the infective lungworm eggs. In the light of present knowledge the following appear to be the most satisfactory methods of treating badly infested pens:

1. Moving the pen to well-drained virgin soil, preferably sand.
2. Removing the top 3-inch layer of old soil, safely disposing of it, and then replacing it with clean sand or fine gravel.

If conditions preclude either of these, then heating the ground thoroughly with a large torch, boiling water, or steam might be tried. In these treatments it is essential that the ground be heated well to a depth of at least two inches, and to accomplish this is considerably more of a task than most persons would believe. Leaving troublesome pens unoccupied over winter or for a year appears to be an ineffective method of treatment.

Treatment of Foxes with Lungworm Trouble

Whenever a fox develops the slightest wheeze, rattle, or other evidence of lung-

worm infestation, it should be promptly moved to clean and dry quarters, where the picking up of infective lungworm eggs will be reduced below the danger point. The animal should be kept in such quarters until after it has made a complete recovery. It is important that patients be taken out of badly infested pens as soon as possible, because the sooner the picking up of lungworms is stopped the better are the chances of recovery. Satisfactory types of hospital pens for foxes undergoing treatment are as follows:

1. Self-cleaning pens provided with heavy-gauge 1-inch mesh wire floors set about 18 inches above ground.
2. Concrete, asphalt, or board-floor pens that are well drained and so made that they can be readily and effectively cleaned.
3. Earth-bottom pens placed on well-drained virgin soil preferably sand, or where the old contaminated soil has been removed, safely disposed of, and replaced with clean sand or fine gravel.

The hospital pens should be no less than 12 feet long and 6 feet wide; otherwise the patients will not be afforded a fair chance of keeping in good condition, much less recovering from the ill effects of lungworms. It is important also that they be kept scrupulously clean, particularly as regards fecal material. All manure should be thoroughly cleaned up each day and safely disposed of. During freezing weather earth-bottom hospital pens should, at monthly intervals, be moved to clean ground or the soil in them changed.

The patients should be placed on a palatable and nutritious diet and fed liberally. Good feeding is essential to building up resistance. Apparently no one has yet succeeded in finding a drug that is both safe and effective against lungworms in foxes or any other animals. Every now and then there are persons who claim to have discovered such a remedy, but thorough investigation invariably has demonstrated that these remedies are either ineffective or more injurious to the patient than to the parasite. Some of the so-called lungworm medicines sold for the treatment of foxes, as well as some that have been recommended for the treatment of other kinds of animals, have been tested at the U. S. Fur-Animal Experiment Station, and without exception all were found ineffective against lungworms in foxes. Moreover, the injection of drugs into the windpipe or lungs is an exceedingly dangerous measure and is to be avoided by the average fox farmer.

Within the past few years there have come on the market two distinct types of tracheal swabs for the treatment of lungworm-infested foxes. The first of these is a rather crude and unsatisfactory outfit consisting of a heavy and long-galvanized-wire handle on the end of which is fastened a small piece of sponge. This swab is passed down the windpipe through a small piece of rubber tubing and the windpipe swabbed out with a sponge.

The other device is really a combination tracheal syringe and tracheal swab, the latter having a sponge-capped brush on its end. When this instrument has been passed down the windpipe, the plunger of the syringe is inserted so as to protrude the brush from the thimble-like structure on the end of the long syringe-nozzle, as well as to inject simultaneously a liquid preparation into the lungs. Extensive tests have been made at the Experiment Station, both critical and clinical, of this instrument. Findings indicated that it possesses one feature of considerable value in the diagnosis and treatment of lungworm infestation in foxes, in that the brush portion of the swab usually removes practically all the lungworms it reaches. In critical tests on 10 foxes that were killed 12 to 24 hours after treatment, the brush removed 116 (38.4%) of the 302 lungworms present in the windpipe, bronchi, and bronchioles. There were only 24 worms left in the trachea, all of these being in three particularly long-bodied animals in which the instrument failed to reach to the farthest end of the windpipe.

Observations indicate that the common lungworms of foxes tend to work gradually up into the windpipe from the air passages in the lungs. For this reason, the periodic treatment of foxes, at intervals of ten days to two weeks, eventually removes all lungworms present, provided reinfestation is effectively prevented.

Clinical tests of the instrument have yielded encouraging results. Although the judicious use of a tracheal swab at intervals of two weeks appears greatly to hasten recovery of patients, such treatment is not of much value if the patients are allowed to stay on badly infested ground. Best results are obtained when the instrument is used as a supplement to good feeding, care, and sanitation.

The passage of tracheal swabs is a delicate surgical operation attended with great danger unless certain important surgical and sanitary precautions are observed. For this reason, it is strongly advised that the use of one of these instruments be undertaken only by a competent and skilled veterinarian who has had considerable experience in the use of either tracheal swabs or bronchoscopic instruments. Some of the precautions advised in the use of tracheal swabs on foxes are as follows:

1. Perform the operation under as sanitary conditions as possible, preferably in a clean operating room where both hot and cold running water are available.
2. Thoroughly clean and sterilize the entire instrument before using, as well as before using on each successive patient.
3. Provide a separate brush for each each patient.
4. Soften the brushes by soaking them in boiling water for at least 15 minutes just before using.
5. Pass and withdraw the instrument slowly and very gently; never use force.
6. Do not treat a patient oftener than once a week.
7. Use a good speculum and be sure that the animal is well restrained while the instrument is being passed.

The treatment of lungworm trouble in foxes is a matter requiring considerable time, patience, and close attention to details of sanitation. Although some patients may show marked improvement

Demonstration of the New General Electric Portable X-Ray Machine taking a radiograph of a lame foot of "Equipoise."—International Photo.

within a couple of weeks after being treated with a tracheal swab and placed in special sanitary quarters, it usually requires from one to three months to cure completely a rattler or wheezer, if treatment is undertaken before the condition of the patient has become too serious.

* * * *

Breeding Data on Fur Bearing Animals*

THE accompanying table records concisely the puberty, estrus, and gestation periods in the commonly raised fur bearing animals. It has been compiled from trustworthy information furnished through correspondence and conversations with practical breeders as well as with scientists interested in animals propagated for fur. The cooperation which all these men gave indicates their interest in the study and its practical importance.

The results of the work when summarized were somewhat disappointing in that instead of revealing the information expected, they indicated the dearth of it. Many breeders who had handled stock for years apparently had very little exact knowledge about the breeding habits of their animals. Fortunately, others had kept detailed records and made close observations, so were in a position to supply valuable data.

If any reader finds that the figures do not agree with his experience, the authors would appreciate a communication to that effect, in order to correct errors and accumulate a greater volume of data. The table is published with the knowledge that it lacks perfection, but with the hope that it will fill the existing vacancy and be helpful.

F. B. Hadley.

Madison, Wisc.

PUBERTY, ESTRUS AND GESTATION PERIODS IN FUR-BEARING ANIMALS

ANIMAL	PUBERTY	ESTRUS				GESTATION		
	Average age (months)	Breeding Season	Duration (days)	Repeats (days)	Occurs after parturition (days)	Shortest (days)	Longest (days)	Average (days)
Beaver	20	March	2–10	7	9	60	90	65
Ferret	10	March April	3–9	10–14	60	42	.....	42
Fisher	11–12	March April	5–10	.....	2–10	350	355	352
Fitch	10	Feb. March	6–10	20	90	42	45	43
Fox	10	Jan. March	7–12	9†	300	50	55	51
Iltis	10	April	3–4	20	56	41	43	42
Karakul—Sheep	6	Sept.	1–2	15–18	90–180	146	152	148
Marten	4–5	Aug.	2–3	7–14	130	259	275	267
Mink	10	March April	1–3	6–12	300–330	42	62	52
Muskrat	10	Feb. March	.....	.....	150	19	22	21
Nutria	6–7	Any time	2–3	28	Same day or next	130	150	140
Opossum	10–12	Spring	½–1	30	300	12	13	12½
Otter	22	Jan. March	18	35	270–300	49	62	55
Rabbit	5–9	Any time	Few hrs. to several days	10	1	28	33	31
Raccoon	12	Spring	6	21	6–14	63	66	65
Skunk	10	March	.....	.....	300	60	66	63
Stone Martin	4–5	Aug.	2–3	7–14	120	259	275	267

*Published by Extension Service Univ. of Wisc.

†Uncommonl y.

Principles of Dog Feeding*

WHEN one considers the feeding of dogs, one is faced with the difficulty of the varied conditions under which dogs are kept, the great variation in their sizes and breeds, and the different purposes for which dogs are fed; for instance, some dogs are kept for purely utilitarian purposes and have to be maintained in fit and working condition, such as the shepherd's dog, while for others, such as the lap dog, the question of fitness for work does not arise. The animals with which we have been concerned previously are kept for profit (with the exception of the occasional hack or hunter), so that their nutrition, being an economic problem, has received much attention from research workers and agriculturists with the result that a definite attempt is made to feed these animals on common-sense lines. On the other hand the nutrition of the majority of dogs, particularly pet dogs, is artificial and irrational, besides being extravagant and often productive of disease.

Naturally, the dog is a carnivorous animal and though by domestication and in many cases pampering to an extreme degree, his habits and inclinations have changed to a considerable extent, anatomically and physiologically he is still a carnivore.

The dog is naturally an animal of open spaces, full of life and energy and thus taking a great deal of exercise. His normal condition is therefore lean: leanness is not necessarily indicative of starvation, though many misguided people think so. A naturally fat dog is an impossibility, and as dogs are not artificially fattened for food production there is nothing to be gained by making them fat. An over-fat dog seldom remains healthy for long, because such a condition is indicative of excessive feeding and deprivation of the exercise that is necessary to keep him in normal health. No shepherd's dog is fat, and shepherd's dogs are very seldom ill; they get plenty of exercise and sufficient food to keep them in a condition that fits them to do their work—work which is naural to them, and which they soon like. If they were given more food than is necessary they would soon become useless for the purposes for which they were intended.

Between the shepherd's working dog and the lady's lap dog there is a wide gulf, so far as their utility is concerned, but that is no reason why pet dogs should be fed with food more suitable for sick children than dogs, as so many of them are. The majority of pet dogs are grossly over-fed, many owners having the mistaken notion that the only way to make a dog happy is to feed him lavishly. Canine happiness is assured by plenty of free exercise (not tethered by a string to his owner), with sufficient food for his maintenance, and a sympathetic understanding on the part of his owner. The happiness of a dog depends more upon liberty to use his legs than on freedom to fill his stomach with unnatural food.

The teeth and mouth of a dog are those of a carnivore—designed for holding and tearing meat and for crushing bones; in short they are designed for doing hard work. This, then, should indicate the physical nature of the food most suitable for dogs, and the digestive apparatus, being that of a carnivore, is adapted for the digestion of flesh. Primarily, therefore, the food of dogs should be such that the teeth and jaws are brought into active use and the greater part of the food should be hard and dry. Hard biscuits, and bones that can be crunched, such as calf rib bones, bring the teeth and gums into active play and keep them in good condition. Perpetual feeding with soft, sloppy food invariably means the accumulation of tartar on the teeth, with weakened and diseased gums

*Linton, R. G., M.R.C.V.S.: Animal Nutrition and Veterinary Dietetics. Published 1927 by Wm. Green & Son, Ltd., Edinburgh, Scotland. American edition published by Wm. Wood & Company, New York.

and subsequent pyorrhea and loosening of the teeth. All dogs should be given bones to eat and play with, not only do they keep the teeth and mouth clean and in good order, but they provide the minerals, particularly calcium phosphate, so necessary for the good growth of young dogs, and their undigested residues assist in carrying off from the intestines the excretal products collected there. Very hard, dense and splintery bones, such as rabbit, game and poultry bones, should not be given to dogs, particularly pet dogs, as they are liable to cause laceration of the gut. Nevertheless, country dogs often eat such bones without apparently suffering any harm therefrom.

During the digestion of bones the hydrochloric acid dissolves out the lime salts and leaves the indigestible stringy and fibrous matrix as a residue, so that when bones are given in excessive amount this indigestible residue leads to constipation. Bones should not be given to dogs that are ill, as the digestive processes being deranged, the bones are not digested and impaction of the colon and rectum result. Occasionally dogs swallow bones, such as vertebrae, which are too large for them, with the consequence that they stick in the esophagus or in the cardia of the stomach.

It might be thought that the natural diet of the wild dog—flesh, blood, fat and bones—would also be suitable for dogs kept in partial confinement under domestic conditions. Such a diet, however, is not economical, and experience has shown that it is not necessary. It has also been found that an exclusive diet of flesh does not give as good results as a mixed diet containing a proportion of carbohydrate for dogs doing hard and prolonged work, such as hounds and sheep dogs, notwithstanding the fact that the dog is naturally a carnivorous feeder. Pariah or scavenger dogs of the East are, as is well known, omnivorous feeders, of necessity if not by choice.

A GOOD test of the efficiency of a maintenance ration for dogs kept in more than usual confinement can be made with the diet allowed to dogs kept in quarantine for a six month's period. Many dogs representing most breeds have passed through the quarantine kennels of the Royal (Dick) Veterinary College. The amount of exercise is limited to bi-daily freedom of half an hour or so in an open court. With the exception of one dog, a West Highland terrier, which arrived with an eczematous condition of its skin, all the animals have completed the six months' period in excellent health and without becoming too fat. The daily ration of these dogs consists of dog biscuits and horseflesh. The dog biscuits are made from bakers' "seconds," mutton greaves ("cracklings"), and boiled horseflesh, to which is added a percentage of salt. The horse-flesh is obtained from healthy horses that have been shot and bled. The ration is divided into two parts; in the morning a dog biscuit is given dry and at 4:00 P. M. a larger feed is given consisting of broken biscuits soaked in hot water and mixed with par-boiled horse-flesh. The heavy feed is given in the evening in order to keep the dogs quiet during the night. From our experience, we conclude that it is better to feed dogs twice during the day instead of once according to the popular idea.

The allowance for an Airedale or Collie, weighing approximately 27 kilos (60 lbs.), was weighed and analyzed. The dog biscuit weighed 380gm., and the fresh unboiled horse-flesh 170 gm. The analysis of each was found to be as shown in Table I.

TABLE I.—ANALYSIS OF DOG BISCUIT AND HORSE-FLESH.

	Biscuit Per Cent.	Flesh Per Cent.	Total in Ration Grammes
Water	15.73	74.94	-----
Fat	2.28	2.60	13
Albuminoids	16.62	21.00	99
Carbohydrates	62.89	-----	239
Fibre	1.10	-----	-----
Ash	1.38	1.08	-----
Not accounted for	-----	0.38	-----
	100.00	100.00	351

This ration, which the clinical department of this College has found by experience to be suitable for adult dogs weighing about 27 kilos and not getting more than sufficient exercise to keep them in good health, was fixed upon without reference to any former investigation undertaken to de-

termine a satisfactory diet. It is, therefore, particularly interesting to compare it with the rations for dogs suggested by Dechambre. Dechambre published the results of his investigation in 1919, and stated that he considers that maintenance requirements for the dog can be calculated according to the surface law, as is the case with other animals. He published a table setting out the maintenance rations for dogs from 5 to 100 kilos in weight and also gave rations suitable for dogs doing moderate and hard work. For a dog of 27 kilos, such as an Airedale or Collie, he allows for maintenance:—Protein 55gm, fat 15gm and carbohydrate 300gm, giving a total of 388 nutritive units reckoned on the formula (total protein+total carbohydrate+total fat×2.2). The compared rations in grams, therefore, are as given in Table II.

TABLE II.—PREPARED RATION IN GRAMS

	Protein	Fat	Carbohydrate	Total Nutritive Units
Dechambre	55	15	300	388
R. (D) V. C.	99	13	239	367
Difference	+44	—2	—61	—21

A comparison of these two rations shows that there is a close similarity in the total nutritive units supplied, but the diet given in this College contains nearly twice as much protein as that recommended by Dechambre and considerably less carbohydrate. The total protein allowed by Dechambre for hard-working dogs of 27 kilos weight is 100gm. As the 380gm of dog biscuit contains 63gm of protein, it might be assumed that the biscuits by themselves would constitute a complete food, at least for adult dogs, but experience has shown us that excellent health is maintained when the above quantity of flesh is added to the biscuits. It is also to be assumed that a proportion of the mutton greaves or "cracklings" is not digested by the dog, but at the same time it will serve a useful purpose by supplying bulk to the ration and to some extent take the place of the bones and more or less indigestible skin, some of which is, no doubt, consumed by the dog in its natural state. The albuminoid ratio of Dechambre's ration for the resting dog of 27 kilos is 1 to 6; that of this College, calculated from the chemical analysis, is 1 to 2.7 (the albuminoid ratio of bitch's milk is 1 to 2.2).

FOR the convenience of readers, Dechambre's Table of Nutrient Requirements is reproduced here, the metric weights being converted into English weights. This table may be of some assistance in constructing diets for dogs of different breeds and weights as it shows the proportions of protein, fat and carbohydrate that should be given as well as the actual weight of food required, but as stated previously, we prefer to give rather more protein in the form of meat than is recommended by Dechambre.

Fresh raw meat, in moderation, should occasionally be included in the diet of dogs. If, however, it is given in excessive quantity particularly to dogs not getting a good deal of exercise, it is liable to cause meta-

TABLE III—TABLE OF NUTRITIVE REQUIREMENTS FOR DOGS FOR MAINTENANCE AND FOR MODERATE AND HARD WORK

Weight in pounds	Nitrogenous matter in ounces			Fat in ounces			Carbohydrate in ounces		
	Maintenance	Moderate work	Hard work	Maintenance	Moderate work	Hard work	Maintenance	Moderate work	Hard work
11	.6	1.1	1.2	.20	.2[5]	.3	3.5	4.4	5.8
22	1.1	1.8	2.0	.30	.4	.5	6.0	7.5	9.7
33	1.3	2.1	2.3	.35	.5	.6	7.0	9.0	11.8
44	1.6	2.6	2.8	.40	.6	.7	8.7	11.0	14.2
60	1.9	3.2	3.5	.50	.7	.9	10.6	13.4	17.6
88	2.5	4.1	4.6	.70	.9	1.2	13.8	17.5	23.0
110	2.9	4.7	5.3	.80	1.1	1.3	16.0	20.0	26.5
132	3.3	5.4	6.0	.90	1.2	1.5	18.0	23.0	30.0
140	3.4	5.7	6.3	.95	1.3	1.6	19.0	24.0	31.0
175	4.0	6.5	7.2	1.10	1.5	1.8	22.0	27.5	36.0
200	4.4	7.1	8.0	1.20	1.6	2.0	24.0	30.0	40.0
220	4.6	7.6	8.5	1.30	1.7	2.8	26.0	32.0	42.0

bolic disturbances with eczematous conditions of the skin, but if given in moderate quantity is undoubtedly beneficial.

Minced raw liver given in small quantities once a week or so is a useful laxative for house-kept dogs, but it should not be given too frequently nor too liberally as the nucleo-protein of its composition is responsible for the formation of uric acid. Ill-health of dogs has sometimes been traced to an excessive amount of liver being included in the diet.

Sheep's and Pigs' lungs, "lights" are often boiled down for dogs, but the nutritive value of "lights" is not in any way comparable with that of flesh and the cartilaginous material, of which lungs are largely composed, has practically no nutritive value.

The most common error in dog feeding, apart from that of giving too much food, is for people to give their dogs sweetened and highly-seasoned foods from their own tables. No dog requires such food and he will be perfectly contented and certainly keep in better health, with plainer fare such as dry dog biscuits containing a proportion of meat with an occasional allowance of raw beef. It is true that if his appetite is cloyed with sweet and sickly foods given to him at all times of the day, he will decline to eat dog biscuits. But if a dog so spoiled is given plenty of fresh air and exercise and all fancy foods withheld, he will soon appreciate the more suitable fare.

No dogs require feeding more than twice a day and many people think that feeding once a day is the better method, but with this we do not agree. Feeding should be done regularly and no titbits should be given at odd moments of the day.

It is perhaps scarcely necessary to emphasize the importance of keeping dishes from which dogs are fed in a clean state, but often this attention to hygiene is forgotten and stale food is left on the platters to become sour. Some dog owners have curious ideas about canine dietetics; for instance, there is a belief that is rather common, strange though it seems, that "milk breeds worms!" It is fortunate for the human race that this fallacy has no foundation in fact. Another curious idea is that meat causes distemper in puppies; the truth is that many a puppy would show a much better development and be far more healthy if a little raw meat was included in his diet.

Oatmeal porridge is not a good food for dogs unless, like sporting dogs and hounds, they get plenty of exercise. It should be only given in very small quantities, or not at all, to house dogs. Potatoes should also be avoided particularly for house dogs and those kept in confinement.

For dogs getting plenty of exercise, or work, such as sporting dogs, hounds, shepherds' dogs and the like, the diet must be given in proportion to the work done and the table which has been given previously may be of some assistance in this respect. But the owner should be able to judge the requirements of his dogs by their condition and feed them accordingly. Oatmeal, maize meal and boiled flesh form the main diet of most sporting dogs and hounds, but in many kennels no flesh is given, the soup from the boiled flesh being poured over biscuits and the boiled flesh thrown away.

For feeding puppies the best results are obtained by making use of one of the special puppy foods. Soon after puppies begin to take a little solid food, small quantities of minced beef, of good quality, should be given occasionally and useful supplemental foods are Virol and small doses of cod-liver oil. It is of the utmost importance that puppies be exposed to fresh air and sunlight as much as possible and that the house in which they are kept is free from dampness.

As the majority of dog owners utilize dog biscuits to form the greater part of their dogs' diets it may be of advantage to them to know that the large size biscuit weighs on an average five ounces and if of the type containing greaves of which an analysis has been given, that it contains: protein 0.83 ounces; fat 0.11 ounces, and carbohydrates 3.14 ounces. But the composition of dog biscuits is, as is to be ex-

pected, somewhat variable as manufacturers have their own individual ideas on the subject. The dog biscuits put on the market by reputable firms are of very good quality and constitute a convenient and suitable diet for every kind of dog. Occasionally flesh products of inferior quality are incorporated in biscuits, but the leading firms of biscuit manufacturers are particular to see that only good quality is used,

* * * *

RATIONAL TREATMENT FOR ACCIDENTS OF THE PUERPERIUM

I have read with interest the "New Method of Handling Eversion of the Uterus" in the November issue and "Replacing Everted Uterus" in the December issue of VETERINARY MEDICINE (pages 442 and 485, respectively).

The doctor from Oklahoma does not attempt to give any reason for eversions nor does he differentiate in any. However, the doctor from Idaho goes more into detail, even asking himself the question "whether the eversion is due to straining, or the straining is due to the eversion."

To me it seems as though there should not exist such diversity of opinion in a condition that has been so well worked out, to say nothing of the variance in nomenclature and treatment, something which tends to make various phases of the same condition specific entities in themselves. Such misnomers as "milk fever" are certainly indicative of nothing and should be discarded.

What we choose to call milk fever, eclampsia, parturient paresis, and some cases of obstetrical paralysis, are undoubtedly various phases of the same condition. The impaction and bloat are the necessary accompaniments due to intestinal stasis. Any or all of these symptoms may be seen in the same patient, depending upon the degree of endocrine dysfunction and the time spent with the patient for observation.

As we find this syndrome chiefly at parturition or puerperium, and knowing of the drain made on calcium stored in body by the fetus during pregnancy, surely the reasonable thing to expect is a decalcification. In those cases found during pregnancy, or even not pregnant, a careful history will invariably reveal a low calcium and vitamin D intake and an abundant lactation. In the cases where any doubt exists a therapeutic test can be made by the careful administration of a soluble calcium salt, and, if recovery ensues, that should substantiate the diagnosis.

The administration of parathyroid seems contraindicated, as we are not dealing with a parathyroid pathology but rather a parathyroiid collapse, due to the strain placed upon the gland in its effort to catalyze and absorb calcium. This is proven therapeutically by the almost miraculous recovery following the administration of calcium intravenously. Giving parathyroid could have but one effect, namely, to further draw upon calcium storehouse, temporarily producing a hypercalcemia, being shortly followed by hypocalcemia.

It is readily discernible that blood-calcium determinations are certain to vary depending upon the time made. Further, they may vary according to the methods used in the test, also by complicating factors as nephritis with phosphate retention, and diminution of serum protein.

Depending upon the degree of decalcification and the relative rapidity in which this process takes place, depends, of course, the clinical picture we see. Doctor Baker says, "a few will stand up, but more will lie down, choosing the most filthy spot in the precinct." He says nothing of those that fall down, and it is reasonable to assume those that lie down do so because they feel they cannot stand up.

When we consider that at first we have intermittent spasms of the voluntary muscles, then tetany, prostration and death, is it any wonder the majority lie down? And with the decalcification progressing to the involuntary muscles, is it any wonder we have intestinal stasis, urine and fecal retention?

It is a well known fact that when we have a dysfunction of one endocrine, the entire chain becomes more or less involved, and, depending upon the degree of involvement, depends, of course the symtomatology witnessed. Probably due to a lack of this knowledge in the past have we classified and treated as specific diseases the various phases of the same condition.

Dental caries in the future will probably be included in this group, for it is not unreasonable to assume, even despite the fact the bacillus acidophilus is found in caried teeth, the cause of caries to be elsewhere. The withdrawal of calcium from the tooth is certain to alter the medium or pH and probably making it possible for the organism to live there.

It may not be amiss to recall the role calcium plays in the metabolism of bone, teeth, nerves, muscles, etc., as well as in the formation of lipoids. It is vitally concerned in contractility of voluntary and involuntary muscles, a deficiency of which causes tetany. Vitamin D, of course, plays an important part, causing a more complete absorption of ingested calcium, and indirectly assists parathyroids in maintaining serum-calcium balance.

Now let us consider the physiology of pregnancy. After the ovum has been fecundated, descent is made to the primed endometrium and the morula attaches itself to the nidated endometrium. It is very likely that a hormone is produced which inhibits further ovulation and luteinization. After the placenta is formed, placental hormone has the same function to perform. Oestrogenic and progestational hormones are maintained in physiologic balance, and, as gestation nears term, progestational hormone decreases in the uterus and oestrogenic hormone is increased in the bloodstream, thyroids, parathyroids and adrenals, of course, show increased activity.

It is known that oestrogenic hormone stimulates the posterior pituitary in the production of pituitrin, as well as sensitizes the pregnant uterus to pituitrin. With the fetus having attained full intrauterine growth, the uterus sensitized to pituitrin and the posterior pituitary producing pituitrin, we have contraction of uterus and expulsion of fetus. With normal endocrine balance the placenta is passed and the hyperplastic uterus returns to a normal condition.

But here we are dealing with a calcium deficiency which is further aggravated by the ensuing lactation. The uterus is subjected to prolonged, severe muscular contractions in order to accomplish evacuation. The available calcium is consumed, uterine muscles become tetanic, and finally collapse. Abdominal muscles and diaphragm, still able to function, continue contractions and uterus is everted. In this prolonged process of labor with violent contractions of muscles, our available sugars have been consumed, as a consequence, if blood-sugar determinations are made at this time, we find a hypoglycemia. This probably explains the fact why some invetigators find a hypoglycemia and others a hypocalcemia.

Various stages of toxicity are now seen, and, whether the parathyroids have another hormone, detoxifying in nature, or whether detoxification occurs by injected calcium combining with neutral fats to form lipoids, is not known. But we do know from clinical experience the patient becomes rapidly detoxified after administration of calcium. It is very probable that our sugar balance is restored by the action of adrenalin, which is antagonistic to insulin, and has the ability to mobilize and reconvert tissue-glycogen into glucose.

This probably explains why the addition of sugar in some cases is helpful. Depending upon the degree of involvement, depends, of course, the clinical and laboratory picture we see.

We have noted for years that in the replacement of the uterus, the liberal application of chemically pure sugar (granulated) to the endometrium prior to, as well as after reposition, has been of value, along with the intravenous injection of calcium chloride. We make our solutions

as needed and cool to body temperature. In those patients where temperature is about normal we give from 60 to 100 grams in saturated solution intravenously very slowly, requiring about 15 minutes in making the injection. In those with subnormal temperature, we take about one-fourth of this amount and dilute it with the same amount of water and inject very slowly; after about 15 minutes we repeat this dose, and, after 15 more minutes we give the balance. Great care should be observed to make the injection in cases with subnormal temperatures very slowly and not to have the solution too warm. In mares we use about the same dose as in cattle and in ewes from 10 to 15 grams of the calcium salt.

Where replacement of uterus is difficult we use spinal anesthesia and our agent of choice is procaine. We have found this treatment very efficient and does away with all the time-consuming details elaborated upon in the two articles mentioned in the beginning of this paper.

The writer is under great obligation to Dr. J. Stanley Faulkner, M.D., for his valuable suggestions and criticisms in the preparation of this paper.

Danville, Ky. M. H. Doller.

A New Veterinary Cleaning Agent

Recent investigations, which are being continued with the cooperation of Mellon Institute, have indicated probable valuable applications of sodium metaphosphate in the field of veterinary medicine. This previously little-used chemical is now available in powder form for preparing solutions for washing and rinsing dogs and other furred animals.

A special preparation of sodium metaphosphate, rendered slightly alkaline with sodium borate and perfumed with a very little oil of cedar, has been used in the clinical work reported below. The product was secured from the Buromin Company, of Pittsburgh, the donor of the Institute's Industrial Fellowships on Calgonizing and Phosphates.

When mixed according to the directions of one tablespoonful of this powder in one gallon of water the resultant solution contains approximately 0.5% of sodium metaphosphate. This concentration has proved satisfactory with the water supplied in Pittsburgh (5 grains hardness per U. S. gal.).

In part, the reaction of this solution with soap is to form a soluble double salt of the phosphate with sodium and calcium, leaving the soluble soap available for use. The latter would otherwise be precipitated as a calcium soap through the reaction between the soap and the calcium salts commonly present in "hard" waters. However, there appear to be other physico-chemical effects of the metaphosphate itself, as judged by the results of washing and rinsing dogs in the solution indicated.

The results, based on the observations of Dr. Samuel Glenn and of Dr. L. D. Barrett, of Pittsburgh, may be summarized as follows:

1. In using the metaphosphate solution for washing dogs, much less soap is required to generate a satisfactory lather.

2. In rinsing with the metaphosphate solution, the fur and skin of the animal are apparently cleaner than after washing in the usual way with soap alone. There is no doubt that, after drying and brushing, the hair is softer and more glossy. This is a desirable effect in long-haired dogs, but in stiff-haired (or wire-haired) breeds it may be considered a disadvantage by some. However, the natural skin secretions will quickly restore the usual characteristics to the hair.

3. Use of the metaphosphate solution is of decided advantage in cleaning the skin and fur of animals that have been treated locally with ointments. The detergent action of soap is enhanced and the animal emerges from the bath clean and non-greasy.

4. The metaphosphate solution (in concentrations of 2 or 3%) is of value in cleansing the area about a localized skin lesion (such as eczema) and preparing the area and the lesion itself for application of the medicament.

The Infectious Swine Disease Situation*

By A. T. KINSLEY,
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Hog Cholera

THIS is a specific disease of swine caused by a filterable virus. Swine only are affected. So far as known, the virus is propagated exclusively in swine. Within the first few days after the hog is infected various discharges will contain the filterable virus. Hogs manifesting symptoms of cholera also eliminate the virus; however, permanent carriers have not been identified. The length of time that infection may persist on premises is not known. According to investigators, cholera virus is of feeble vitality; surviving for only a few days in open pens.

Experimentally healthy susceptible swine have been maintained within 50 feet of cholera infected swine and cared for by the same attendants without becoming infected. Even when pigeons were permitted to pass from pens containing sick and dead of cholera to pens but a dozen feet away containing healthy susceptible hogs, infection was not introduced.

Regardless of the feeble vitality of virus, it is common knowledge that cholera infection is spread. Pork scraps in uncooked garbage is probably an important source of cholera virus. Cholera infection is also spread by transportation of exposed or diseased swine.

Community sales and community hog clinics are important factors in the spread of hog cholera virus. Trucks from rendering plants not infrequently scatter cholera virus on highways and byways.

Soon after the demonstration by Dorset, McBryde and Niles in 1903 that cholera is caused by a filterable virus, a practical method of producing anti-hog cholera serum, and a method for immunization of swine were devised. By 1913 there were 23 states and 76 commercial establishments producing anti-cholera serum and virus.

At the close of 1932 in the United States there were 49 licensed establishments and they produced over one billion cubic centimeters or 250,000 gallons of serum and nearly 55 million cubic centimeters of simultaneous virus. The magnitude of the serum industry for the past year can be stated in another way. In 1932, production required approximately

109,000—125-lb. pigs for hyperimmune virus.
140,000—250-lb. hogs for hyperimmunization.
45,000— 80-lb. pigs for simultaneous virus.
3,570— 80-lb. pigs for test purposes.

In other words, approximately one hog in each 185 in the whole country was used in serum-virus production in 1932, and there was sufficient virus produced for approximately a 1cc dose and sufficient serum for approximately a 20cc dose for each hog in the United States.

From 1915 to 1932, inclusive, there was over 12 billion cubic centimeters of serum and over 650 million cubic centimeters of simultaneous virus produced by serum plants, and yet the annual loss from hog cholera, except for the year 1926, remained practically the same. This in the face of the fact it is conceded there is no other biologic agent as efficient as anti-hog cholera serum. The fact that hog cholera and vaccination for the prevention of hog cholera has cost the swine industry of the United States at least 27 million dollars annually, or a half billion dollars in the last eighteen years, proves beyond cavil or question that there is something basically wrong with the present system of hog

*Discussion at the 19th Semi-Annual Meeting of Oklahoma Veterinary Medical Association, Ft. Reno, June 19-20, 1933.

cholera control. This persistent and continuous loss indicates that at least most of the states in the principal hog raising sections have either insufficient or the wrong kind of laws and regulations for the efficient control of cholera or the officials are not enforcing them.

Control Measures.—Without doubt, the losses incident to hog cholera can be reduced by the promulgation and enforcement of quarantines, supervised transportation, competent veterinary service, and restrictions on the distribution and use of virus.

The present practically uncontrolled distribution and use of hog cholera virus involves lay vaccination. The present extent of lay vaccination is probably due to several factors. Upward of 100 bulletins and leaflets have been published in the last twenty-five years by various experiment stations and the U. S. Department of Agriculture on hog cholera. Thousands of those publications have reached farmers. Many give specific instructions for the vaccination of swine. Lay vaccination in infected and exposed herds has diminished immediate losses from hog cholera in those herds; however, it is self evident that the use of virus in non-infected herds established hundreds of new centers of infection.

Eradication.—We believe that cholera can be effectively controlled, practically reduced to a minimum and possibly ultimately eliminated by vaccination, quarantine and disinfection, providing the following prerequisites are actually carried out.

1. Make hog cholera a reportable disease.
2. Deputize qualified, practicing veterinarians as quarantine officers.
3. Quarantine and post every farm on which cholera is found.
4. Regulate the transportation of swine.
5. Prohibit the distribution and use of virus, excepting to authorized or deputized veterinarians.

The working details of this plan should be as follows:

Authorized veterinarians should be required to quarantine and placard the premises promptly on which hog cholera is found, and report presence of the disease to the proper officials; vaccinate all hogs that in his judgment will be benefited by vaccination, and see that the owner makes a proper disposal of all infected carcasses.

A re-inspection of the premises to be made by the veterinarian after the disease has run its course and to supervise cleaning and disinfection. Neighboring herds should be vaccinated, if in the judgment of the veterinarian they are likely to become infected. Quarantine all vaccinated healthy herds. This plan does not require universal vaccination, neither does it prohibit vaccination by the use of serum alone, by laymen or others. Carrying out of this plan will not cause any serious interference with the hog owner, neither will it be expensive. Unless some such regulations are put in force, the losses from cholera will not be diminished and a widespread outbreak may occur at any time.

Hemorrhagic Septicemia

THIS is a specific bacterial disease that affects most of the domestic animals, including swine; its occurrence is now apparently accepted by practically all investigators and sanitary officers. In hogs this disease is not so fatal, neither is it so widespread as cholera. It may occur sporadically or enzootically, but rarely as an epizootic. The percentage of losses in affected herds varies markedly. This disease, at least in the beginning of an outbreak, is usually secondary to some other malady, or occurs in swine particularly predisposed.

Hemorrhagic septicemia in swine may occur as a septicemia or as a pneumonic condition. In the septicemic type the temperature ranges up to 105°F.; the appetite is diminished, and there may be lameness and a blush of the skin. This type of the disease is usually rather rapidly fatal.

The symptoms of the pulmonary type of the disease consists of coughing, temperature probably up to 104½°F., thump-

ing, and more or less dyspnea. Affected animals may recover, but more frequently the disease becomes prolonged, and of a chronic nature. The outstanding lesions of the septicemic type of hemorrhagic septicemia are petechial hemorrhages in the lung, kidney, intestine and upon the various serous membranes. Lymph glands are tumefied and congested.

The chronic or pulmonary type of this disease is characterized by an atypical catarrhal pneumonia with or without a fibrinus pleurisy. There is usually also a pericarditis. The type of pneumonia is quite characteristic and consists of different areas in the lung, showing different stages in the progress of the disease. Some areas will show congestion, others red hepatization or gray hepatization and necrosis.

Swine Flu

FLU is apparently a specific infectious disease of swine. It prevails in practically every section of the country and may occur at any season, although it is probably most prevalent during the fall and spring. This is essentially a herd disease, as from 75 to 90% of the herd usually becomes affected within a few hours. The principal symptoms are: a temperature ranging up to 107° or 108°F.; a peculiar but rather characteristic pharyngeal or bronchial cough; thumps, inappetence, marked shrinkage and tendency for the affected animal to hide in its bed. The course of this disease is relatively short; the symptoms vanishing within a few days or week. It is usually not highly fatal unless complications such as hemorrhagic septicemia occur. Herds affected with flu have been observed in which the infection with the bipolar organisms resulted in extensive losses.

The lesions in this disease are entirely out of proportion to the extent or magnitude of the symptoms. There will usually be found a limited, rather mild rhinitis, bronchitis and limited pulmonary edema.

Pulmonary Edema

PULMONARY edema may possibly be akin to flu. It differs from the ordinary flu in that it is more of a toxemia; is much less severe, and as a rule, only a very small percentage of the herd are affected at any one time. The principal symptoms in pulmonary edema are: a rise of temperature of 104° to 105°F., rather moist bronchial cough, marked thumping, diminished appetite, rapid shrinkage and emaciation.

Practically the only lesion that is constant in this condition consists of a waterlogging or edema of the lung. The specific cause of this disease has not been identified but it is invariably associatd with pleomorphic streptococci.

Erysipelas

IN RECENT months, there has been much ado about and a considerable amount of material has been published on swine erysipelas. This malady was identified in the United States some 12 or 15 years ago, although not until recently was the acute type of the disease actually recognized. Erysipelas may be acute or chronic. The acute type of the disease is characterized by a sudden onset, temperature ranging from 105° to 107°F., inappetence, vomition, congestion of the ocular mucosa, edema of the eyelids and ears, and skin discoloration. The outstanding lesions found in cases of acute erysipelas consist of accumulation of bloody fluid in the serous cavity, tumefaction of lymph glands, gastritis and enteritis, the enteritis usually being confined to the small intestine and the gastritis appearing in streaks as though produced by a paint brush. Frequently the spleen is slightly thickened. The chronic type of erysipelas is rather widespread. The principal symptoms consist of a diamond shaped red area on the skin, usually designated as diamond skin disease, the animal will show more or less depression, lameness and cutaneous vesicles may occur. The lesions of chronic erysipelas consist of involvement of the joints; thickening of the skin; sloughing of a portion of the ears or tail or even a foot is common, and an accumulation upon the valves of the heart of fibrous exudate occurs with great frequency.

Erysipelas is a disease that is almost certain to cause considerable trouble in the future. The widespread custom of trucking swine, increases the possibility of the rapid spread of not only this but other maladies. Apparently, when swine erysipelas is once established on a farm, the infection will persist year after year. Whether or not the premises could be rid of infection by sale of all hogs has not been determined; but it is possible that the infection will also persist for a considerable length of time on premises outside the animal body.

Infectious Necrotic Enteritis

THIS condition is probably more widespread and from the viewpoint of economic losses is secondary only to hog cholera. It is usually designated as a filth disease; however, it occurs in swine that are kept under the best sanitary conditions possible. All breeds of hogs are susceptible. It is most prevalent in shoats weighing 40 to 80 lbs., although it may occur in hogs regardless of weight, even suckling pigs being affected. The primary cause of the disease is the *B. suipestifer*. The source of infection is from the excretion of diseased animals. The usual channel of entrance is through the digestive track by contaminated feed or water. The exact period of incubation under ordinary field conditions has not been determined, and probably depends upon the quantity of microbes ingested and their virulence. In some instances, the infection is sufficiently virulent to produce a septicemia. This type of disease is manifested by a relatively high temperature, marked depression, frequent urination, bluish discoloration of the skin and is rapidly fatal. The usual symptoms of suipestifer infection are: persistent diarrhea, gradual wasting away, appetite apparently normal or perhaps exaggerated. Affected animals may live for many days or weeks, and some of them may ultimately recover.

The lesions of the septicemic type of disease caused by suipestifer infection consists of marked bluish discoloration of the skin, hemorrhages throughout the body tissue, usually a marked nephritis, and if the animal lives for several hours, an engorgement and marked tumefaction of the spleen and there may or may not be icterus.

Enteritis resulting from *B. suipestifer* infection, usually involves the large intestine and the appearance of the lesion will vary according to the virulence of the infection and the duration of the disease. When quite virulent organisms are ingested or large quantities of them are ingested at one time, the lesions consist of an acute enteritis in which the mucosa shows a marked congestion or even hemorrhage. As a rule, the inflammation is less intensive and is manifested by the accumulation of a diphtheritic exudate on the mucosa. This is usually associated with more or less necrosis of the intestinal mucosa. The Peyers' patches and other lymphoid tissues of the intestine usually show not only the diphtheritic exudate but also caseation and in the longer standing cases the so-called Welch buttons will be observed.

Dysentery

THIS name has been applied to a condition that occurs primarily in shotes following cattle in feed lots. It has a rapid course and is quite fatal. The principal symptoms consist of a marked depression, bloody diarrhea and rapid shrinkage and emaciation.

The principal lesion characterizing so-called pig dysentery is an acute hemorrhagic enteritis, which primarily involves the intestinal mucosa. The affected portion of the intestine is brick red in color and there is no accumulated exudate as there is in infectious necrotic enteritis.

The specific cause of the socalled pig dysentery has not been positively identified. In many instances there has been isolated from such cases a pleomorphic streptococci or diphtheroid-like organism which may have an important etiologic relation to this malady.

Coccidiosis

THE manifestation of intestinal coccidiosis in swine varies acording to the intensity of the infestation and the condition of the swine. About the only symptoms are unthriftiness and bloody feces.

The principal lesion of coccidiosis is a thickening of the intestinal mucosa. There or may not be evidence of sloughing of variable sized areas of the mucosa and hemorrhages as a result of the slough.

Amebic Dysentery

THIS term is applied to a type of enteritis in which there are myriads of ameba that apparently invade and destroy the cells of the intestinal mucosa. The outstanding symptoms are diarrhea, depression, rapid shrinkage and emaciation.

On autopsy of such cases the intestinal wall is found to be thickened and when exposed the mucosa is covered with a peculiar exudate that gives the appearance of clabbered milk.

Disease	*Symptoms*	*Lesions*
Hog Cholera	Temperature, 106-108° F. Several hogs affected. Inappetence. Hide in beds. Knuckling.	Skin blush. Lymph glands congested and hemorrhagic. Petechia (lung, kidney, epiglottis, bladder). Bone discoloration.
Hemorrhagic Septicemia	Temperature, 105° F. Small percentage of herd affected. Appetite diminished. Lameness.	Petechia in intestine, lung, kidney. Lymph glands congested and hemorrhagic. A typical catarrhal pneumonia— Pleurisy. Pericarditis.
Swine Flu	Temperature, 105-108° F. Herd affection. Hide in beds. Cough, thumps, inappetence. Rapid shrinkage.	Rhinitis. Laryngitis. Tracheitis. Bronchitis. Pulmonary edema.
Pulmonary Edema	Temperature, 104-105° F. Cough. Thumps. Emaciation.	Pulmonary edema.
Erysipelas—Acute	Temperature, 105-107° F. Sudden onset. Inappetence. Vomition. Edema of eye-lids and ears. Skin discoloration.	Bloody fluid in serous cavity. Tumefied lymph glands. Gastritis and enteritis. Spleen thickened.
Chronic Erysipelas	Diamond skin. Depression. Lameness. Slough of ears, tail.	Arthritis. Dermatitis. Vegetative endocarditis.
Infectious Necrotic Enteritis	Temperature, 104-105° F. Variable number affected. Appetite normal. Persistent diarrhea. Emaciation.	Diphtheric inflammation of mucosa of the large intestines. Caseaflon of Peyers' Patches. Welch buttons.
Pig Dysentery	Bloody diarrhea. Marked depression. Rapid emaciation.	Hemorrhagic enteritis.
Coccidiosis	Unthriftiness. Evacuation of bloody feces. Bloody feces.	Thickening of the intestinal mucosa. Slough of mucosa. Flake-like deposit on mucosa.
Amebic Dysentery	Diarrhea. Emaciation.	Clabber milk-like deposit on mucosa.

Shifting Lameness in Horses

By D. M. CAMPBELL

CONSIDERABLE investigation of arthritis and related pathology in horses, cattle, sheep and swine is in progress in various parts of the world. So far publication of the results of this work has been fragmentary, i. e., each investigator has reported the findings in his particular problem without much reference to the problem as a whole. An attempt to correlate some of this work, particularly as it applies to horses, may not be without value to practitioners at this time; although manifestly conclusions drawn at this stage of the work must be subject to such amendments as further research or clinical observation or both may make necessary.

"Shifting Lameness" is not an altogether satisfactory title under which to discuss those osteo-dyscrasias and nerve dysfunction, common in horses and mules and according to recent investigation due, apparently, to impaired nutrition, for the reason that not all the lameness due to this cause is of the shifting type, nor is lameness an invariable symptom of this ailment. On the other hand, impairment of locomotion is in the majority of cases probably the earliest symptom and it is usually of a migratory type in the beginning. Further, many cases do not develop beyond the stage of lameness, probably in not a few cases for the reason that the disability involved results in the animal being discarded before more advanced stages have had time to develop.

OSTEOMALACIA, osteoporosis or big head, appears to be the terminal stage of this ailment. In some localities, particularly in the Philippine Islands, the condition progresses rapidly and this terminal stage is commonly reached; generally however the pathological process develops more slowly in continental United States; perhaps in part at least, for the reason already given, the terminal stage where there is marked and often enormous enlargement of the facial bones and marked rarefaction of the skeletal structure generally, is rarely seen.

In the light of our present knowledge on the subject, we shall have to include in the earlier stages of this ailment, such diverse local manifestations as spavin, ringbone, sidebone and navicular disease; many sprains, strains, sore tendons joint-lameness not due to traumatism, osteitis, much of what has been diagnosed as rheumatism, shifting and intermittent lameness; stumbling; stringhalt, shivering, paraplegia, certain types of heart involvement, grunting and just possibly roaring. That rachitis in the young animal is essentially a different ailment due to a different cause is by no means proved.

The foregoing affections are responsible for a vast amount of disability in horses and mules and entail an enormous economic loss. Their influence in the supplanting of horse power by mechanical power in cities and on the farm is probably second to no other infirmity of horse flesh; since these disabilities have increased enormously the cost of horse power, and made the even higher cost of automotive power seems less objectionable than it would have seemed otherwise. The responsibility of one or more of the disabilities of this group for retiring valuable race horses from the track is notorious.

WHETHER or not one is prepared to admit that all or even most of the foregoing conditions possess a common etiological factor one must admit they possess at least one thing in common—an astonishingly slow progress made in the elucidation of facts concerning them. To take the final and most obvious stage first: Varnell, who practiced in New York City from 1832 to 1842, saw osteomalacia there; in 1832 Barnum stated it was common in Kentucky and "the southwest"; in 1844 Fancher was familiar with it in Ohio. In 1855

it was everywhere recognized in the United States and Dadd stated it was ascribed to too much phosphorus in the food or drinking water. It was 75 years later that Kintner[1] and associates confirmed this. In the interim of three quarters of a century, nothing was added to the available knowledge on the subject, except that W. L. Williams noted an unusual prevalence of spavin, ringbone and other bone diseases on a central Illinois farm for years following an outbreak of osteomalacia.

Or, take stringhalt—in 1838 Youatt observed: "The great sciatic as it entered the sacro-sciatic foramen was of a yellowish brown hue, its texture was softened and its fibrillae were loosely connected together." Mitchell, 95 years later, confirmed this finding of Youatt's and supplied the first bit of additional information since Youatt's time.* Or, take roaring—nothing has been added to our knowledge of the etiology or pathology of this disease since Law's description of it published in 1863, seventy years ago. Nor can it be said that the practitioner of a decade ago knew any more about spavin, ringbone, sidebone, navicular disease or joint lameness than Percival knew a century ago.

KINTNER'S work has already been reviewed in these pages and need not be given detailed examination here. While his findings constitute the most important contribution to the knowledge of his subject so far made, Kintner was dealing with special conditions and his findings are not altogether applicable generally. In the Philippines osteoporosis is incomparably more prevalent than it is in continental United States. It develops with great rapidity to the stage of facial lesions, sometimes within five months after animals are landed in the Islands. The stages of restricted movement; disinclination to play; a tendency to lie down; resting first one leg, then another; lameness now here, now there; lameness of undetermined origin, strains, soreness, stiffness, stilted gait, stumbling, facial enlargement, incapacity for work and emaciation crowd upon one another in the Philippines and in the severer cases, convert a valuable animal into a valueless one within a year or two. In this country, the progress of the disease is much slower and it is not nearly as prevalent. Beeman stated that 60% of all the army horses and mules in the Philippine Islands are stumblers. Native horses exhibit a higher resistance to osteomalacia in the Philippines than imported animals, still the milder stages of osteomalacia are common even in them. Twenty per cent of the 10,000 calesa ponies used on the streets of Manilla may be seen even today wearing knee pads to prevent breaking their knees; they are chronic stumblers. Osteomalacia is as common in the Philippines in other domestic animals, including poultry, as it is in horses.

Osteomalacia is of enormous economic importance to the army in the Philippines and to the civilian population. Its great prevalence among army animals is of recent occurrence. Formerly, army animals in the Philippines were fed on hay and grain imported from continental United States, but for a long time a movement has been on to use Philippine forage and grain, both as a measure of economy for the army and to supply a market for Philippine products. This resulted in the adoption in 1923, of a grain ration for army animals composed of one-third American oats, one-third copra meal and one-third palay (rough rice) and a forage ration of one-half native rice hay and one-half American hay (chiefly California wild oat hay). Because of lack of production this ration was not fully utilized till 1925. This partial substitution of native for American feeds saved the army in the Philippines approximately $200,000 in 1926, on the cost of the ration. The result on the animals, however, was disastrous; arthritis, ringbone, strained tendons and sprained joints rose to 300% of their former

*T. L. Bolton, M D., independently duplicated Youatt's observation of nerve involvement in stringhalt but carried the investigation no further. His observations were published in the *Journal of Nervous and Mental Disease*, 1892. Rosseau, a French Army Veterinarian, reported the same observation about the same time.

[1]Kintner, J. H.,* and R. L. Holt; U. S. Army Medical Research Department Board; Equine Osteomalacia. The Philippine Journal of Science, 49:1, September, 1932. Review in Veterinary Medicine, Chicago, Vol. XXVIII, No. 6, June, 1933.

level and cases of osteoporosis (where there was a thickening of the mandible or facial disfigurement) rose to 160 per thousand animals per year. Apparently even these figures do not tell the whole story since the investigators elected to call osteomalacia only those cases which showed a thickening of bones of the head. Had those earlier cases and milder types of the disease characterized by intermittent, shifting and occult lameness and lameness of undetermined origin been included as osteomalacia, the rate would have been much higher.

The copra-meal-palay-oats-rice-hay-wild-oat-hay ration has a calcium-phosphorus ratio of approximately 1:3. In Kintner's experiments it was shown that the disease progressed in affected animals fed a calcium-phosphorus ration as low as 1:2.3 and that recovery occurred in all but far advanced stages of the disease where the calcium-phosphorus ratio in the ration was approximately 1:1 and also on a 1:1.4 ratio. Apparently a calcium-phosphorus ration of 1:2 is reasonably safe for well animals. In a short experiment, it appeared the Philippine army ration may be fed with safety by simply adding ground limestone to it in sufficient quantity to bring the calcium content approximately equal to that of phosphorus. A certain minimum of calcium is of course indispensible, but a greatly increased amount is inadequate if at the same time, the phosphorus content of the ration is increased to a ratio of 1:2.5 or more. The experience of the Philippine Bureau of Animal Industry on the contrary casts doubt upon the efficacy of ground limestone added to the feed.

On autopsy, Kintner observed gross structural changes only in the bones and joints. There was a definite replacement of mineral salts in the bones by osteoid tissue. The ash content of bones and their tensile strength was lower in osteomalacia than in normal bones. In the blood of affected horses phosphorus content was greater and the calcium and magnesium content lower than in normal horses. He concludes:

"The cause of osteomalacia exhibited by army animals in the Philippines appears to be due solely to a mineral unbalance. There is no evidence that disturbance of internal secretion, parasitic infestation, heredity, infection or vitamin deficiency played any part in the production of the disease." Apparently Kintner found no nerve involvement.

As stated previously, it is believed that Kintner's findings are not strictly applicable here, since he based his diagnosis solely upon facial lesions, thus excluding a majority of the cases seen in this country; cases which seem to be as truly osteomalacia as are the more advanced cases that show enlargement of facial bones.

MITCHELL [2] of Edinburgh, proceeding on a different plan, has done some exceedingly important work on this general subject. The type of cases investigated by Mitchell have not been shown to be due to mineral unbalance, but the bone lesions so closely parallel findings in osteomalacia as to raise a strong suspicion that they are but different manifestations of the same nutritional deficiency. Mitchell, however, regards the condition as a definite inflammatory disease of the peripheral nerves—a neuritis. He has found macroscopic lesions of the sciatic nerves and less frequently of the lumbo-sacral plexus, the femoral, median and radial nerves in most cases of "shivering," "jinked back" (partial paraplegia), and stringhalf and definite microscopic evidence of nerve degeneration in all such cases examined. "Jinked back" is not a term commonly used in this country, but is described as: A condition where there is an unsteady gait behind, difficulty in turning and inability to back; in bad cases the legs are often crossed, the feet are dragged during progression and there is constant fear of the horse falling. In less marked cases there is doubt as to whether the case falls into the category of a shiverer or of paraplegia.

The following tables of Mitchell's autopsy findings illustrate the close relationship between arthritis, exostosis, ringbone, spavin, navicular disease, shivering, stringhalt, para-

[2]Mitchell, W. M.,; Royal (Dick) Veterinary College, Edinburgh; Some Aspects of the General Osteo-Arthritic Problem in the Horse. The Veterinary Record, 13:38, September 23, 1933.

Table A: Examination of Eleven Clydesdales suffering from "Shivering."

Clinical Examination	Post-mortem Findings		
	Joints Affected	*Bones Affected*	*Other Changes*
Gelding; 2 yrs. old "Shivering" "Grunting"	Both coxo-femora, femorotibial, and tibio-tarsal. Costo-vertebral (numerous).	Both femurs—osteitis shaft. Exostosis R. 2nd metatarsal (splint).	All lymph. gls. hyperplastic. Esophagus—fibrositis. Larynx—intrinsic muscular atrophy left side. Sciatic nerves congested. Intestines—worms. Verminous aneurysm.
Gelding; 4½ yrs. old "Shivering"	Right scapulo-humeral. Left coxo-femoral. Left femoro-tibial. Costo-vertebral (many). Lumbar intertransverse.	Ossified cartilages 3rd phalanges. Osteitis 3rd phalanges. Costal sulcus.	Right sciatic nerve congested. Intestines—worms.
Gelding; 5 yrs. old "Shivering" "Grunting" "Sidebones" "Bogspavins" Heart irregular	Both scapulo-humeral, humero-radial, humero-ulnar, coxo-femoral and tibio-tarsal. Right femoro-tibial. Costo-vertebral (many). Lumbar intertransverse.	Ossified cartilages 3rd phalanges. Osteitis 3rd phalanges. Phalangeal exostoses. 1st and 3rd phalanges. Pelvis—exostoses. Atlas—exostoses. L. and R. 2nd metacarpals—exostoses.	All lymph. gls. hyperplastic. Gastric ulcers. Sciatic nerves congested. Larynx—intrinsic muscular atrophy left side. Degeneration of ligaments right coxo-fem. joint. Intestines—worms.
Mare; 1½ yrs. old "Shivering" "Grunting" General debility Fore fetlocks almost touch the ground "Bogspavins"	Both scapulo-humeral, humero-radial, humero-ulnar, radio-carpal, coxo-femoral and tibio-tarsal. Left femoro-tibial. Costo-vertebral (numerous). Lumbar intertransverse.	Portion of head of left femur semi-detached.	All lymph. gls. congested. Gastric ulcers. Cystic ovary. Sciatic nerves congested. Larynx—intrinsic muscular atrophy left side. Intestines—worms. Verminous aneurysm.
Gelding; 3½ yrs. old "Shivering"	Both scapulo-humeral, metacarpo-phalangeal coxo-femoral, and femoro-tibial. Costo-vertebral (numerous). Lumbar intertransverse.	1st phalanges—exostoses. Osteitis 3rd phalanges.	All lymph. gls. hyperplastic. Esophagus—fibrositis. Sciatic nerves congested.
Mare; 3 yrs. old "Shivering"	Both scapulo-humeral, humero-radial, humero-ulnar, and coxo-femoral. Right tibio-tarsal. Right metatarso-phalangeal.		
Gelding; 6 yrs. old "Shivering" "Sidebones"	Costo-vertebral (numerous).	(Leg, bones and joints not examined).	All lymphatic glands—hyperplastic.
Gelding; 3½ yrs. old "Shivering"	Both scapulo-hum., coxo-fem. and tibio-tarsal. Costo-vertebral (many). Lumbar intertransverse.	Ossified cartilages 3rd phalanges. Osteitis 3rd phalanges. 1st phalanges—exostoses.	All lymphatic glands—hyperplastic.

(Continued on next page)

Clinical Examination	Post-mortem Findings		
	Joints Affected	*Bones Affected*	*Other Changes*
Mare; 2 yrs. old "Shivering"	Both scapulo-humeral and coxo-femoral. Left tibio-tarsal. Costo-vertebral (many). Lumbar intertransverse.	Small metacarpals and metatarsals—exostoses. Osteitis 3rd phalanges.	All lymph. gls. hyperplastic. 2 large chronic retro-pharyngeal abscesses. Gastric ulcers. Intestines—worms.
Mare; 10 yrs. old "Shivering" "Sidebones" "Ringbones" "Windgalls" Does not lie down.	Both shoulder, elbow, hip, stifle and hock. All joints of feet. Costo-vertebral (many). Lumbar intertransverse.	Practically every bone in the body.	Esophagus—fibrositis. Gastric ulcer. Both sciatic and femoral nerves—congested. Cystic ovary. Intestines—worms.
"Shivering" "Grunting" Carpal exostosis (n. f.) Sandcracks both fore feet.	Both scapulo-hum. coxo-fem. and femoro-tibial. Right humero-radial and humero-ulnar. Costo-vertebral (many). Lumbar intertransverse.	Small metacarpals and metatarsals—exostoses. Carpal bones.	All lymph. gls. hyperplastic. Chronic pleurisy. Larynx—atrophy left side. Left sciatic nerve—congested. Intestines—worms.

Table B: Examination of Five Horses Suffering from Partial Paraplegia ("Jinked Back").

Clinical Examination	Post-mortem Findings		
	Joints Affected	*Bones Affected*	*Other Changes*
Hunter, gelding; Partial Paraplegia "Ringbone"	Both humero-radial, humero-ulnar. Both coxo-femoral. Costo-vertebral (numerous). Lumbar intertransverse.	1st phalanges—exostoses. 2nd phalanx R. exostoses. Osteitis 3rd phalanges (navicular disease) (front).	Calcareous plaques wall of heart (right atrium). Verminous aneurysm. Slight perihepatitis.
Hunter, gelding; Partial Paraplegia "Splints"	Both scapulo-humeral, humero-radial, humero-ulnar and radio-carpal. Right coxo-femoral. Both femoro-tibial. Costo-vertebral (many).	Splints right fore. Cervical vertebræ—exostoses.	Esophagus—fibrositis. Chronic pleurisy. Chronic peritonitis. Lymph gls.—hyperplastic. Intestines—worms. Verminous aneurysm. L. sciatic nerve congested. Yellow effusion intermuscular fascia hind limbs.
Hunter, mare; Partial Paraplegia	Both shoulder, front fetlock and pastern. Costo-vertebral (slight). Cervical interarticular between 6th and 7th.		Split 3rd upper cheek tooth. Esophagus—fibrositis. Chronic peritonitis (slight).
Thoroughbred gelding; 1½ yrs. Partial Paraplegia	Both shoulder, elbow, hip and stifle. Costo-vertebral (many). Cervical interarticular.		Intestines—worms. Lymphatic glands—hyperplastic.
Thoroughbred; 1 yr. old Partial Paraplegia	Left scapulo-humeral. Both elbow and hip. Left femoro-patellar. Both tibio-tarsal. Left metatarso-phalangeal. Costo-vertebral (many). Lumbar intertransverse. 1 Cervical interarticular.	Navicular disease early.	Soft tissues not examined.

plegia and certain atrophic muscular conditions.

A dissection of the larynx in the four cases classed as grunters revealed some degree of atrophy of the intrinsic muscles on the left side. None of the cases which were not grunters showed such atrophy. He says:

"These four cases [of grunters] have helped to strengthen a vague impression I formerly had that sooner or later a 'grunter' is liable to 'go wrong' either by becoming a roarer or by developing other dystrophies associated with the nervous system or various osteo-arthritis conditions about the limbs. If further evidence of laryngeal muscular atrophy can be obtained in all cases of horses kown to be grunters during life, the significance of grunting as a clinical sign would be beyond doubt." Its possible significance in examination for soundness must not be overlooked.

Mitchell concludes: "No matter whether the pathological changes be in joints, bones, nerves or heart muscle, all the changes can be accounted for by alterations from the normal blood supply brought about by some as yet unknown noxious agent or agents."

THE relation of cause and effect to calcium-phosphorus unbalance in the ration and the degenerative process noted in the peripheral nervous system is by no means proved; but in the light of the investigations so far made, seems less improbable than other theories as to the nerve dysfunction that appears responsible for the various motor disturbances discussed in the foregoing. The profound effect of calcium deprivation on the nervous system is shown in milk fever, in paralysis of swine, in tetany and in other acute conditions.

Although chronic arthritis is probably the commonest disabling condition, we meet with in the horse, (and of serious import in most other domestic animals as well) the wide variation in the susceptibility of individual animals makes the determination of the cause or causes from clinical observation on any given farm, extremely difficult. The very considerable variation in the rations provided the horses even in a single community make it difficult for the practitioner to draw definite conclusions in the matter, even though his experiene be wide. But at military posts in continental United States there are usually considerable numbers of horses and mules maintained on remarkably uniform rations—rations for the most part representative of the average of rations of the animals of civilians in the same localities. Veterinary officers at such posts have an opportunity far superior to that of the civilian practitioner to contribute to the solution of the osteo-arthritic problem from clinical observation and possibly simplify and shorten the research necessary to establish the facts in the matter, a prerequisite condition to effective preventive and therapeutic measures.

THE late Major Beeman was much interested in this subject and made some valuable observations [3] pertaining to it before his untimely death two years ago. Others are doing valuable work on the problem at the present time. The writer is more familiar with what is being done at Fort Benjamin Harrison than elsewhere and believes a preliminary report of the observations of Major C. W. Greenlee, Station Veterinarian at this post, may constitute an important contribution to the solution of the important problem of arthritis in all domestic animals; and in fact, in man as well.

Fort Benjamin Harrison (near Indianapolis, Indiana) is located in a section where a great deal of excellent timothy hay is grown. In accordance with the custom of purchasing forage locally for army posts and the well known predilection of horsemen for "nice, clean, leafy timothy" for horses, timothy hay has been used at this post almost to the exclusion of other varieties of hay. The grain ration consists of oats and one pound of bran daily and in some outfits two pounds of oil meal daily. Occasional cases of "big head" have developed at this post and occasional fractures have occurred in government animals while

[3] Greenlee, C. W. and H. N. Beeman; Osteomalacia in the Philippine Islands. Army Veterinary Bulletin.

at work. Upon autopsy, both classes of cases revealed arthritis and exostosis involving nearly all joints in the carcass and the usual bone changes of osteomalacia. Of far more importance, however, in reducing the effectiveness of the animals of the command has been lameness, transitory, intermittent, migratory and chronic; slight, occult, marked and severe; referable to joints, tendons, ligaments and muscles. In fact, every sort of lameness not caused by external violence has been prevalent to an abnormal extent, reaching its height in the spring and lowest prevalence in the fall.

Major Greenlee being thoroughly familiar with osteomalacia in the Philippines (it was his report to the Commanding General of Fort William McKinley at Manilla that caused the matter to be referred to the Army Medical Research Board and resulted in the investigation by Major Kintner and associates *v. supra*), at once recognized the similarity of the conditions at Fort Harrison to those at Fort McKinley; as he had done at his former station, he recommended a change in the ration at Fort Harrison, which has been made. Before the change in ration was made, however, opportunity was afforded for some very interesting and very important observations.

The nutritive ratio of protein to carbohydrates and fats in the ration of Fort Harrison was approximately 1:9.17. The calcium-phosphorus ratio averaged approximately 1:2.54. It will be recalled that the calcium-phosphorus ratio in the Philippine ration was about 1:3 and in the investigation, it was determined that the danger point in phosphorus was reached somewhere near a ratio of 1:2 and that on feed containing these minerals in a ratio of 1:2.3, affected animals became progressively worse. At Fort McKinley on the calcium 1 to phosphorus 3 ratio, more than 60% of the animals of the command were chronic stumblers and more advanced stages of osteomalacia was present in the high incidence previously stated.

At Fort Harrison, on a ration more than half way from the danger point to the high phosphorus content of the Philippine ration, only 10% of the animals were showing definite symptoms of osteomalacia while cases of osteroporosis or head lesions showed an incidence of only about 2%; contrasted with a rate of 16% in the Philippines. Furthermore, there was no seasonal occurrence of the disease in the Philippines; it showed a decided seasonal prevalence at Fort Harrison.

THE difference in the calcium-phosphorus ratio of the rations fed at the two posts seems insufficient to account for the great difference in its effect. Major Greenlee believes the explanation lies in the difference in the water consumed by the animals and in the effect of grazing at Fort Harrison. Major Kintner found that calcium in the water is as important for the animals as calcium in the feed and should be taken into consideration along with the calcium-phosphorus ration in the feed. The drinking water of the animals at all posts in the Philippines, except Fort Mills, is almost calcium free. At Fort Mills (Corregidor) the water contains 125 parts of calcium per million and there alone of the Philippine posts no severe cases of osteomalacia developed, although Major Greenlee saw the milder types of the disease at Fort Mills. At Fort Harrison, the water analyzes 0.44 gm. of calcium per gallon—almost the same as the water at Fort Mills. The phosphorus content of the water at Fort Harrison is very low (0.0322 gm. per gallon). During the winter months the animals drank an average of six gallons of water daily; during the summer months, approximately twice this amount. They thus obtained some 2.5 gm. more calcium daily in summer than in winter from this source and very little more phosphorus. Further, at Fort Harrison the animals were grazed during the summer on blue grass all that conditions permitted. In addition, almost no oil meal and bran were fed during the summer season. It is believed these factors account for the greater prevalence of the disease in winter. Possibly the fact that there is more sunshine in the latitude of Indianapolis and the sunshine contains more

ultra-violet rays in summer than in winter, thus conducing to a better utilization of available calcium is also a factor, but this is by no means certain since the proper utilization of the calcium in the feed and water is very closely tied up with the amount of phosphorus (pentoxide) present.

It will be seen that the ration at Fort Harrison was one well designed to produce osteomalacia. The use of timothy hay exclusively, resulted in a low calcium intake; the use of bran by all organizations and of oil meal in addition, by some of them during winter months increased the phosphorus content of the grain ration and the only other grain fed, oats, has been shown by Mellanby to have somewhat of a decalcifying action on bone tissue. The calcium (CaO) to phosphorus (P_2O_5) ratio in the feed varied in different stables and at different times between 1:2.5 and 1:2.8 for horses under 1,150 lbs. in weight; between 1:2.7 and 1:3.1 for horses over 1,150 lbs. in weight; and between 1:2.1 and 1:2.6 for mules.

Symptoms

There is a wide variation in individual tolerance of calcium-phosphorus unbalance and a considerable individual variance in the symptoms; particularly in the sequence of symptoms in the early stages of osteomalacia. In general, stiffness, stumbling and abnormal standing postures may be said to be the earliest manifestations of the disease; since this is particularly objectionable in polo ponies this type of animals were the greatest sufferers from osteomalacia; the number rendered useless for playing because of this fault approaching 50% annually of the average number such animals at the post. Another early symptom is a constant shifting of the weight off first one leg then another, when standing; on any picket line at Fort Harrison, this constant change of position could be noted. Many of the affected animals would not stand in the same position more than a minute. Some were resting two legs at a time which is distinctly abnormal in a horse or mule, unless it be very tired, and uncommon then. This symptom alone enables the veterinarian to pick out from a group of horses tied on the picket line practically all that are affected with osteomalacia. This stage is soon followed by an inclination to lie down more than normal and in a few days or weeks the animal may appear to be tired all the time; it loses its "life" and "spirit." The stride is shortened and the gait becomes "stilted" and soon there is a distinct "ouchiness" on first starting out. None of the cases in the foregoing stages are likely to be called to the attention of a veterinarian. In these stages the disease will be diagnosed, usually only if the veterinarian discovers it.

It is only when the animal goes lame that its condition is brought to the attention of the veterinarian. This type of lameness is prone to develop suddenly—instantly, without any explainable cause; in army animals commonly while being exercised, often when being led. Often there are no lesions observable, or there may be swollen and painful joints or tendons. The shoulder, hip and stifle joints are perhaps most frequently involved. The animal recovers under treatment only to go lame, a day or a week or a month later, in a different leg. There is apt to be perversion of the appetite and animals may be noted eating manure. Symptoms of tetany or even of tetanus may supervene. All the early symptoms become more marked, the attacks of lameness come on more frequently and are more stubborn to treat; it becomes painful for the animal to move at all or even to stand, the bones of the head begin to enlarge first shown by a ridge on the mandible laterally just below the gum margin, there is a bulging of the facial bones, finally there is sudden emaciation, which is the precursor of death within a few weeks. Naturally, few if any affected animals are retained beyond the period when lameness renders them useless and the prognosis is hopeless. The appetite remains good to the end. Even before emaciation occurs, the skin is involved frequently; becoming rough and pimply.

Lesions

The postmortem lesions are remarkably uniform. No opportunity has occurred to

autopsy a case in the very early stages, but in animals destroyed because of the disease or that die of intercurrent causes, there are extensive exotoses in various parts of the skeleton. Many joints are involved in the pathological process showing a vegetative growth and discoloration of various synovial membranes, or an erosion of the articular surface of the joints; frequently both conditions are present in the same joint. Macroscopically, there are reddened areas on the shafts of the bones and in the bone marrow. It is noteworthy that joints that have shown no pain or swelling, or have given rise to no lameness, may be as badly involved as those that have caused lameness or progressed through stages of swelling and tenderness. It leads to the suspicion that joints are tolerant of extensive structural changes if there be no infection, or mechanical interference with their function, and that the shifting or migratory lameness is referable entirely to the general condition and not to the local lesion. It raises a question as to the value of any local treatment.

Nerve trunk lesions exactly similar, macroscopically, to those described by Prof. Mitchell were observed, in the Philippines by Major Greenlee who noted also a prevalence of ulcers in the cardiac portion of the stomach of affected animals.

Treatment

The treatment adopted at Fort Harrison was very simple and highly effective. Slightly affected animals, those stumbling and shifting the weight constantly from one group of legs to another, were grazed as much as possible in season, the oil meal and, except in rare instances, the bran was eliminated from the ration. Those showing lameness, whatever the degree, were hospitalized and alfalfa substituted for the timothy hay; the oats was continued; the bran and oil meal feeding was discontinued. The results were striking, even spectacular. The stumbling, the impaired gait, the appearance of weariness, the lameness disappeared. The animals became normal as to gait and behavior, full of life and eager on the bit. The effect of an intravenous injection of calcium in milk fever in a cow or eclampsia in a bitch or paraplegia in a hog is no more spectacular in its effect than is the substitution of alfalfa for timothy hay in cases of osteomalacia. The transformation is a little slower in occurring in osteomalacia (four to six weeks), but the change in the appearance of the animal is as great. Where facial lesions have occurred they remain, thus the "big head" as a lesion and symptom is not cured. It seems unlikely that the lesions in the joints can be wholly removed in the short time required for the animal to recover. The joint lesions, that is the eroded cartilages and vegetative growths on synovial membranes may be permanent just as are the numerous exostoses, but they apparently cause the animal no pain, inconvenience or loss of function. Complete functional recovery (except for exostoses, causing mechanical interference with joints, ligaments or tendons) may be said to occur with amazing promptitude.

The changes in the ration, which brought such satisfactory results, reduced the calcium-phosphorus ratio from an average of 1:2.54 to approximately 1:1. The following case records are typical for cases at Fort Benjamin Harrison:

Report of Typical Cases

K168.—A brown, gelding mule; Height, 15:3; wgt. 1,150 lbs. Foaled in 1921; purchased by the army in 1927 at Cincinnati and shipped to Fort Harrison, where he has since remained. Conformation excellent; an exceptionally good work mule.

Previous Veterinary History: In the hospital from Nov. 20, 1929 to Jan. 8, 1930 for the treatment of spavin in the right hock. In the hospital from Feb. 3 to Mar. 20, 1931 for the treatment of arthritis of the right shoulder. In the hospital from Aug. 13 to 26, 1932 for the treatment of arthritis of the right shoulder. In neither case could the cause of the arthritis be determined; that is, there was no history of a bruise or strain.

Recent Record: Brought to the veterinary hospital April 2, 1933, lame in the left hind leg, with symptoms of spavin, but no enlargement. The next day this animal was exhibiting symptoms of acute gonitis in the left stifle.

April 21, 1933, the hospital notation on this day was: "Lies down much of the time and when standing raises the hind feet alternately and rests the fore legs alternately as much as possible. The animal is in excruciating pain fore and aft."

May 3: "For the past three days the animal has been holding up the right hind leg almost continuously."

May 19: "Not so restless."

May 25: "Extremely restless, alternating the weight fore and aft and knuckling forward in the left hind leg (symptoms of chronic gonitis). Face appears to be enlarging. Measures from crest to crest, 8⅛ inches."

June 22: "More bulging of the face. Skin dry and scaley and pimply over the neck, shoulder and sides of the chest. Measurement from facial crest to facial crest, 8⅜ inches."

July 1: "Two skin lesions on the right front leg somewhat resembling summer sores and oozing serum, one lesion 1½ inches and the other two inches in diameter. The animal is lying down more than half of the time."

August 1: Measurement 8⅝ inches. The head and face badly disfigured by enlargement. The animal showed no "life," had to be kicked to get up and forced to move.

Up until this time, the animal had been continued on the same diet that it received with its organization, which according to the standard analysis, had a calcium-phosphorus ratio of about 1:2.8. The period of four months in the veterinary hospital had been a period of observation only. At this time the ration was changed to one of alfalfa hay and oats; calcium-phosphorus ratio approximately 1:1.

September 1: "The coat is improved. Skin lesions much improved. The animal stands a normal amount of time and walks readily."

September 29: "Skin lesions all healed, coat in good condition, the animal ready to run and difficult to catch. Sent back to his organization and immediately put to work on a road scraper."

November 15: This animal is still in good condition and working satisfactorily. His recovery from osteomalacia is complete except that the head remains disfigured by the enlargement. (Two weeks later the head is improving in appearance and distance across the facial crest has decreased ¼ inch.)

K169.—A brown, gelding mule; Height 15:3, wgt. 1,175 lbs. Purchased on the same day and in the same place and sent to Fort Harrison in the same shipment with K168. This animal went into an infantry organization, K168 into artillery; therefore they were kept in separate stables.

Previous Veterinary History: In the veterinary hospital, Dec. 10 to 26, 1929 for the treatment of acute teno-synovitis in right front fetlock.

Aug. 28 to Sept. 24, 1932, in the hospital for treatment of sprain of the left shoulder joint; cause unknown.

Recent Record: Brought to the veterinary hospital April 1, 1933 showing symptoms of spavin lameness in the right hind leg, but no visible exostosis. Upon inquiry, the company horseshoer stated that this mule had been crampy in the right hock for some time and he had also been lame on and off for a year, sometimes in front and sometimes behind. He had adjusted the shoes frequently without benefit. Within a few days after coming to the hospital, this mule began to hold up its right hind leg (gonitis).

April 15, 1933: "The animal is still lame in the right hind leg and seemed lame in front also, shifting the weight on the front legs very frequently and holding up the right hind leg much of the time."

The diet was changed to alfalfa hay and oats, a calcium-phosphorus ratio of about 1:1.

April 22: The animal lay down much of the time. When tied so it could not lie down, it shifted the weight on the front feet frequently and held up the hind feet alternately (gonitis both sides).

May 8: "Looks better. Not so restless."

June 10: "General condition better. Animal shows more life."

Although he was not fully recovered, the animal was sent back to his organization and put on a diet of clover and light timothy mixed hay (clover 70%, timothy 30%) and oats.

July 1: Working ok. and looks good.

August 1: The same.

September 1: The same.

November 15: As good looking mule as there is on the Post, has good "life" and is working steadily.

This case was very much like the preceding one, but since the diet was changed earlier in the attack, the osteomalacia was arrested before disfigurement of the head occurred.

B026.—A Bay gelding, height 16 hands; wgt. 1,150 lbs.; foaled 1920. Purchased at Kansas City, Missouri, July, 1924, shipped direct to Fort Harrison, where it has since remained, except for summer trips to Fort Knox. This animal had been one of the best riding horses on the Post, always used by the commanding officer of artillery.

Previous Veterinary History: In June 1932, it was brought to the veterinary hospital with a history of stumbling badly. At this time it showed a symptoms of navicular disease. The disease progressed rather rapidly and by April 1933, the animal could no longer be used at all.

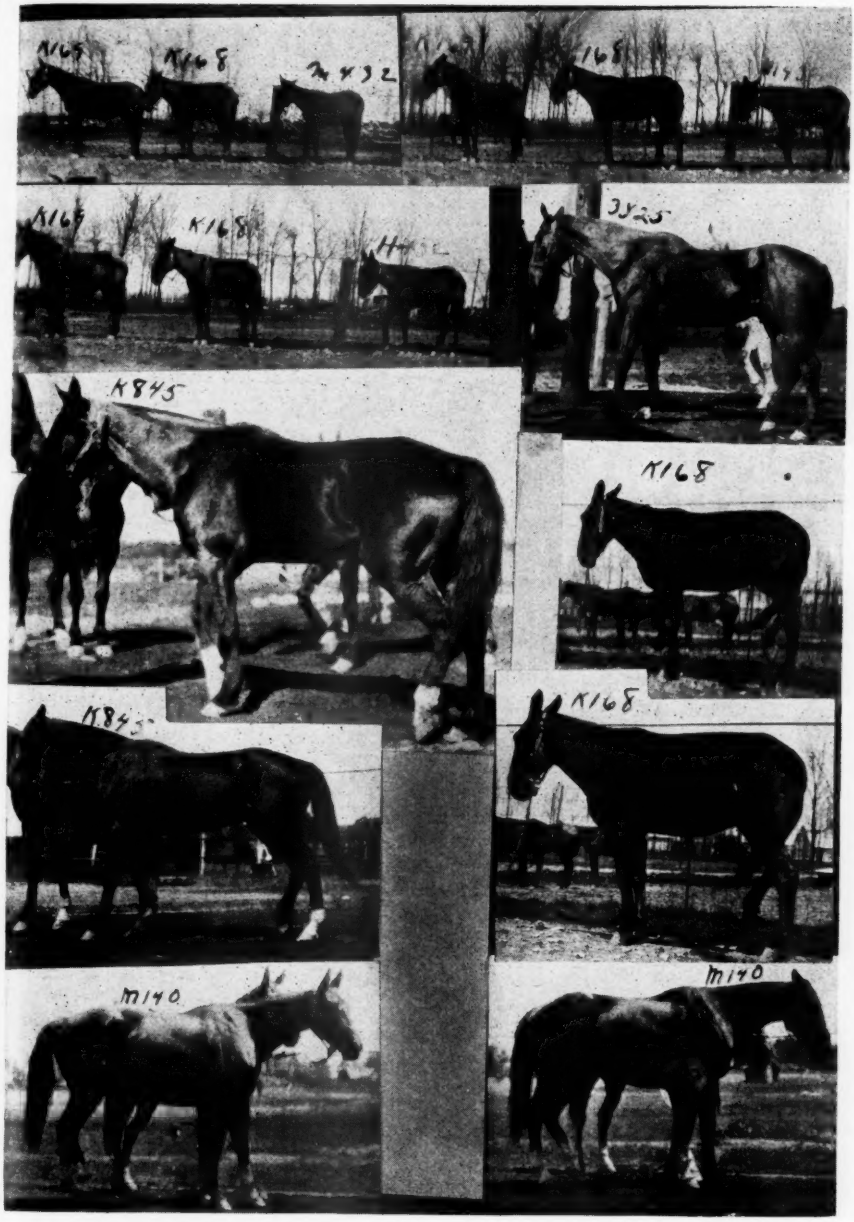
Recent Record: Because of sentimental attachment to the animal, it remained about the Post and on Aug. 1, 1933, I noted it alternately resting one fore and one hind leg. That is to say, it would stand with the weight on the left front and the right hind legs and after a short time, change the weight to the right front leg and the left hind leg and keep this up for hours. It did not shift the weight so frequently, however, as many cases do.

Sept. 1, 1933: Put in the hospital and on a diet of alfalfa hay and oats, calcium-phosphorus ratio of approximately 1:1.

September 10: The animal was examined by two veterinarians visiting the Post and without any history of the animal, they both unhesitatingly pronounced it a case of navicular disease.

October 25: The animal was no longer lame. He was given a severe test, being ridden over very rough ground and stumbled only once.

November 13: The animal was pronounced



Typical views of cases of osteomalacia on the picket line at Fort Benjamin Harrison. The photographs were taken at intervals of one to three minutes. Note the animals are not twice in the same position. This constant shifting the weight is one of the early characteristics of osteomalacia. Note most of the animals are resting two legs at a time. Animals in this stage have an impaired gait, are prone to stumbling and to sudden attacks of acute lameness. They lie down more than normal and are "ouchy" on starting.

cured and returned to duty. It at no time received any treatment other than a change of diet. It is being ridden daily, shows no lameness, no tenderness and no tendency to stumble.

B023.—Chestnut gelding; 16 hands, 1,150 lbs.; foaled in 1917. Purchased in Kansas City, Mo., in 1924, shipped direct to Fort Harrison.

Previous Veterinary History: Feb. 17 to 28, 1932 was in the hospital for the treatment of a strain involving the superficial and deep flexor tendons of the right foreleg. This animal stumbled much for a year following its discharge from the hospital and fatigued easily.

Recent Record: Brought to the hospital on April 7, 1933; appeared to be lame both in front and behind; was retained under observation.

April 14, 1933: Shifted the weight more than normal and trotted distinctly lame both front and rear.

May 1: The animal was observed eating manure greedily.

May 8: Condition unchanged, still eating manure. The diet was changed at this time to alfalfa hay and oats.

July 1: Animal appeared normal and was returned to its organization and turned out to pasture.

November 15: The animal is not lame, is not restless, does not eat manure and appears to be ok. in every way. It has not been worked since its discharge from the hospital, but this is for the reason that it is not a very satisfactory animal, and the organization does not require its services at this time.

H432.—A brown mare mule; foaled in 1924; purchased at Fort Robinson, Nebraska, July 1929 and received at Fort Harrison in April 1930.

History: The stable sergeant states that the animal has been useless 18 months. Always lame somewhere, very nervous and very excitable; could not be worked a whole day without going acutely lame. She is a sort of outlaw, difficult to do anything with and not worth her feed.

Recent Record: Feb. 20 to 28, 1933, in the hospital for some disability which was diagnosed as paralysis of the left super-scapular nerve. The animal was so nervous and excitable that no satisfactory diagnosis could be made. The animal recovered and was returned to the organization.

April 20, 1933: Returned to the hospital lame in the right foreleg, but was too excitable for a more definite diagnosis to be made.

April 21: Diet changed to alfalfa hay and oats.

May 8: Condition the same.

June 1: Looking much better, becoming more quiet.

July 1: Apparently fully recovered. Returned to organization and put to work.

November 15: The animal has worked every day since being discharged from the hospital, is not lame, not nervous and now a favorite with the stable sergeant. A greater tribute to the change in disposition could hardly be made.

E911.—Mare mule, aged 10 years; wgt. 1,070 lbs.; excellent conformation. Purchased at Fort Robinson, Nebraska, August 1929; arrived at Fort Harrison April 1930.

No previous sick record.

May 21, 1933: Presented at the veterinary hospital on account of lameness, undoubtedly lame both fore and aft. There appeared to be a lameness in the right shoulder with a decided incoordination of the hind quarters. Rami of the mandible were thicker than normal. The diet was changed to alfalfa hay and oats and in one month all indications of lameness had disappeared and the animal was returned to its organization, apparently fully recovered.

November 15: The animal has worked regularly since its discharge from the hospital. Appears ok. in every way.

3B93.—Brown mare mule, aged seven years; wgt. 1,325 lbs. Purchased at St. Louis, Mo., April 1932; received at Fort Harrison, May 19, 1932; excellent conformation.

May 20, 1933: Presented at the veterinary hospital with the history that it had been stiff every morning for four or five months and for the last month had been traveling very peculiarly. Upon examination the animal was found to be very stiff; suffering from tetany. A few years ago we should have called this tetanic rheumatism, explained to the owner that such conditions usually occurred in winter and spring, prescribed salicylates and turned the animal out to pasture.

May 24. A diagnosis of osteomalacia was made. The animal was placed on a diet of clover hay and oats.

July 21: The animal was returned to its organization apparently normal. It was again put on a diet of timothy hay and oats.

September 5: The animal was again placed on sick report for osteomalacia, as it was stumbling excessively, falling frequently and injuring its knees. It was not hospitalized but remained with its organization working regularly as usual, but the diet was changed to alfalfa hay and oats. We did this to see if the animal could be cured while remaining at work.

November 10: It was dropped from sick report apparently fully recovered. We believe it will be O. K. so long as it remains on its present diet.

M140.—Horse, black gelding, aged 7 years; wgt. 1000 lbs. Purchased at Pierre, South Dakota, June, 1930; received at Fort Harrison August, 1930. This animal became one of our prize winning polo horses.

No veterinary history of importance until last spring when it became very sore, shifting its weight very frequently as long as it remained standing and when alone, would lie down much of the time.

May 25, 1933: Diagnosis — osteomalacia. Placed on a changed diet and made a remarkable improvement. In one month it left the Post and did not return until about October 1st. During the time it was away from this

Post, its diet consisted of low-grade timothy hay and oats.

October 1: Upon returning to the Post this animal was very thin. No "life," apparently stiff all over; coat lusterless. Placed on a diet of alfalfa hay and oats.

November 15: The animal has gained about 150 pounds, is in better spirits and there is no indications of restlessness.

K845.—Horse, bay gelding, aged 12 years; wgt. 1150 lbs. Purchased at Richmond, Kentucky, October, 1928; shipped direct to Fort Harrison.

No veterinary history except trivial traumatic conditions due to kicks. (From this point on, the record is identical to that of M140, which see.)

1Y58.—Horse, age given on records as 22 years.

No veterinary history. Has been an excellent horse, used for polo and general riding.

April 20, 1933: Brought to the veterinary hospital on account of lameness in left foreleg. Attendant stated that the animal suddenly went lame while being led from exercise. An examination showed left front pastern joint to be very tender, gait very short; seemingly stiff all over. Rami of mandible slightly enlarged.

May 2: I noticed the animal eating manure.

May 15: The animal was walking better and was returned to his organization so that effects of exercise might be noted.

May 19: While being led at exercise, this animal suddenly went excessively lame in right shoulder.

May 23: Destroyed. Autopsy revealed typical lesions of osteomalacia in practically all the joints and bones.

IY30.—Horse, age given on record as 18 years. No record of when or where purchased, which of course means it was purchased before the present system of Preston branding was adopted.

This is a very good riding horse, a very hardy individual.

Veterinary history: Strain of both flexor tendons of right foreleg sometime in April, 1932.

May, 1933: While inspecting the organization to which this animal belongs, we noticed this animal standing in an unnatural manner and shifting its weight frequently. Upon examination the rami of the mandible were found slightly enlarged and the bones of the face seemed to be bulging, i. e., there was a fullness in the face above the upper molars normal to a horse four or five years of age, not the thinness customary in an aged horse. As we were short of clover and alfalfa hay, this animal was continued on the regular diet, except for pasture whenever possible. (See illustrations of M140 and K845.)

October 14: The animal died of an intestinal obstruction. Autopsy revealed extensive erosions of the articular cartilages of the hip, shoulder and stifle joints. Synovia of the joints was dark colored, and sometimes tinged with blood. The synovial membranes were thickened. The shafts of the long bones showed petechia beneath the periosteum and some blood spots in the bone marrow. The rami of the mandible were slightly thickened, and although facial bones showed little or no bulging when the head was boiled out, there was a space on the maxilla above the first and second molars on each side where the outer plate of bone was destroyed, exposing porous structures beneath.

The idea that osteomalacia causes lameness is not new; that it is a nutritional ailment has been recognized for at least half a century. James[4] speaking of the early symptoms, stated: "A short, stiff gait is shown, perhaps a little lameness in one or more of the limbs which may shift or entirely disappear. There is rigidity of the loins and resemblance to a rheumatic attack. . . . I have seen a horse fracture both femurs, starting a heavy load; another going only a little stiff, fell and fractured the bodies of four dorsal vertebrae." And again: "The

Case IY30: Lame from tendon strain in 1932 a year later showed thickened mandibular rami. Died of intestinal obstruction and on autopsy extensive involvement of practically the whole skeletal structure was found.

food is probably responsible. It is becoming rarer as the land is better cultivated, and it is not dreaded here [St. Louis, Missouri] as it was formerly."

Diggs[5] read a paper on "Rheumatism" before a meeting of the Indiana Veterinary Association in 1890. When he had concluded, Thompson inquired how he distinguished between acute rheumatism and osteoporosis, stating he had had many cases

[4]James, H. F., Osteoporosis. *The Journal of Comparative Medicine and Surgery*, Vol. VII, No. 2, April 1886, p. 193.

[5]Diggs, E., Rheumatism, *American Veterinary Review*, Vol. XV, No. 11, February 1891, p. 721.

where he had found it impossible to distinguish between them except by an analysis of the urine.

Morris[6] in a paper read before the Fourth Semi-Annual meeting of the New York State Veterinary Medical Association in 1893, stated: "It is a non-inflammatory disease of bone, characterized by defective action in one or more of the joints, affecting one or two of the limbs in an alternate manner, a much tucked-up condition of the abdomen, an arched spinal column, a straightening of the limbs [gonitis] and, as the disease progresses, an enlargement of the facial and sub-maxillary bones, with defective mastication, accompanied with tenderness upon manipulating the bones of the face. During the entire stage of the disease the pulse remains about normal, with slight variation of temperature, obscure pains, metallic in character, resembling that of rehumatism."

Again, he speaks of "A constant degree of lameness in some one or more of the extremities at the same time, the peculiarity of which is when lame in two limbs at the same time it is that of the hind and fore limbs of opposite sides." In this he too noted affected animals resting two legs at once, almost a pathognomonic symptom of osteoporosis.

Wende, discussing the same paper, described a case "lame in one leg, then the other." Hoskins discussing the same paper, said: "There is no form of lameness it will not assume." He also speaks of a "remarkable recovery under the lime water treatment" and that the best treatment he had found "is to turn them into grass." At the same meeting, Willganz described a horse "lame in the different extremities and for which rest usually was a cure," and another, a race horse said to be "lame all over." Hinckley spoke of cases "turned out as being incurable and left to themselves, made a beautiful recovery."

Hinebauch[7] saw much asteomalacia with renal complications in North Dakota in the winter of 1891-92 and described it as "millet disease."

Cadeac[8] has given the most useful description of osteomalacia prior to the recent work of American army veterinarians and of Prof. Mitchell. Like other early writers on this disease, he recognized the connection of lameness with osteomalacia, but not the connection of osteomalacia with lameness, as the following passages from this discussion show:

"Some animals suddenly show signs of slight or marked lameness which is migratory and remittent and often attributed to rheumatic diathesis." And again: "The diagnosis of osteoporosis is very difficult at the beginning, at which time it manifests itself exclusively by a migratory and remittent lameness and by a more abundant elimination of phosphates." Again, he said: "It may now be safely stated that horses affected with deformities of the head, especially the maxillary bones have been suffering from the disease for a long time."

Prof. Cadeac and associates were convinced fully that osteomalacia is of nutritional origin as shown by the following: "The etiological conditions that govern the development of the disease seem always the same. In [illegible] y case, the patients have received a diet of bran or mill products for some time previous to the appearance of the disease, hence the [common] name 'bran sickness.'" Cadeac referred here to the occurrence of the disease in France and Switzerland. Having a calcium oxide-phosphoric acid ratio of approximately 1:33 it will be seen that more than any other common feed of horses, bran unbalances the calcium-phosphorus ratio and promotes the development of osteomalacia. Feeding bran mashes once or twice a week was formerly a common custom of the caretakers of carriage horses, track horses and other well-cared-for road horses whose work was irregular. That may have accounted for the

[6]Morris, C. D., Osteoporosis. *Journal of Comparative Medicine and Surgery*, Vol. XIV, No. 6, December 1893, p. 397.

[7]Hinebauch, T. D., Millet Disease in Horses, presented at the First International Veterinary Congress of America. Chicago, 1893. A. V. R., Vol. 17, No. 8, November, 1893, page 898.

[8]Cadeac, C., P. LeBlanc and C. Carougeau; General Veterinary Surgical Pathology; Trans. by L. A. Merillat in The Principals of Veterinary Survery; Alexander Eger, Chicago.

higher incidence of lameness in such horses than in less pampered work horses. The explanation "bad conformation" for curbs, spavins, side bones, navicular disease, sprains, strains, etc., never had the full support of clinical observation; too many animals of good conformation succumbed to one or more of these ailments and too many individuals of bad conformation escaped them.

There has been no lack of recognition of lameness as an early symptom of osteomalacia. That a great majority of the cases exhibit only lameness and nervous symptoms and for one reason or another never progress to a point where head lesions are observable has not been appreciated or understood. We owe this important discovery to clinical observation in the army.

As to whether calcium in the form of calcium carbonate added to feeds deficient in CaO in proportion to the P_2O_5, or whether feeds naturally containing calcium and phosphorus in a proper ratio must be used, is undetermined. Kintner reached the conclusion the former method will suffice; the Philippine Bureau of Agriculture reached the opposite conclusion and import from the United States all forage for their imported, pure-bred animals of high breeding value. Doctor Buencamino, who does a large practice in Manila takes a some[illegible]t intermediate position. He uses calcium carbonate powder largely in his practice, adding it to the feed of affected animals, believing he is able thus to "carry them along for about a year" and while not effecting a cure or even a complete arrest of the disease, he believes that gets a considerable additional service out of them by this treatment. It is not practical to put native animals in the Philippines on imported alfalfa hay because of its scarcity and high cost. In view of the ease with which alfalfa hay may be obtained in all parts of the United States, it seems desirable at present, for the practitioner to rely upon it for affected (lame) animals rather than to experiment with the addition of ground limestone to the feed.

Of course, it does not necessarily follow because arthritis in horses is mainly nutritional in origin, that the major portion or any part of the arthritis in other animals is nutritional. Research now under way in California indicates that at least some of the arthritis in lambs is due to infection; Graham in Illinois isolated *Br. abortus* from arthritic joints of swine; various investigators in Sweden found the same organism in diseased joints of cows. On the other hand, malnutrition is everywhere recognized as a cause of diseased joints in poultry. In the Philippines, Greenlee saw enlarged joints, twisted legs and crooked breast bones in ducks that were eating the same feed that was responsible for osteomalacia in horses and mules. In South Africa, investigators are inclined to charge nutritional disturbances with responsibility for at least a considerable part of the arthritis occurring in all domestic animals, in that section of the world.

For 20 years our agricultural experiment stations have been too busy telling farmers how to get along without horses to devote time or public funds to investigating the diseases of this animal. For research[9] into the diseases of the horse, American veterinary practitioners must rely upon the army or upon the work of foreign investigators. Our own experiment stations have been blind to the ultimate effect of supplanting horse power on the farms by gas engines. They have distributed numberless bulletins and other discussions on the cost of mechanical power per acre and per bushel, per year and per hour, all promoting the destruction of a profitable outlet for farmers' products. County Agents in their enthusiasm, kindled by the manufacturers, spared no effort to place bigger and better tractors and mortgages on every farm. Farming the farmer (and the taxpayer) has been a pleasant and a profitable occupation for a generation. It may be less profitable in the future. In that case we may hope for some research into the effects of various feeds on power production by horses and into cause and prevention of other diseases and disabilities of the horse.

[9]Except for investigation of breeding diseases of race horses at a single station and some investigation of periodic ophthalmia by a charitable foundation.

Abstracts

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Coccidia of Geese

The domestic goose harbors four Eimeria species,[1] of which three, *Eimeria parvula* Kotlan 1933, *Eimeria anseris* Kotlan 1932, and *E.nocens* Kotlan 1933, occupy the intestines, while the fourth species, *E.truncata* Railliet and Lucet 1890, seemingly parasitizes solely the kidneys. All four species may easily be differentiated on the basis of the morphological characteristics of their oocysts. There are also ecological and embryological differences. The most common species, *E.parvula,* has spherical or spherico-elliptical oocysts without micropyle; the diameter is 10-15/10-14 microns. This species appears to be non-pathogenic. *E.anseris* and *E.nocens* occur less frequently and are found mainly in young geese, in connection with intestinal lesions. Whether they are the sole cause of them, must be left to further investigation. Possibly, paratyphus-bacteria may play a role in bringing about the lesions formerly attributed to the coccidia alone. The oocyst stage of *E.nocens* is strikingly similar to the kidney coccid *E. truncata;* the oocysts, however, are larger; they measure 25-33/17-24 microns. *E. truncata* is a common parasite of young geese. Under certain circumstances and after repeated invasions it is capable of producing severe symptoms. A moderate invasion may prove harmless in many cases.

Temperature of Bacteriological Incubators

A study[2] of the constancy and uniformity of temperature of 14 bacteriological incubators has shown that a uniform temperature of 37°C for 48 hours is never obtained. In partially or completely filled incubators, average temperatures over a 48-hour period ranged from 32.5° to 45.0°C. A method of estimating temperatures of incubation from counts on agar plates is presented. Water-jacketed types of incubators were more uniform in temperature than the anhydric type. The method of ventilation also affected the temperature of the incubator.

Treatment for Trichomonas-Vaginitis

Stovarsol has proven highly efficient in cases of human trichomonas-vaginitis.[3] It is used in dry form; 12.5% stovarsol are added to equal amounts of kaolin and sodium bicarbonate. A teaspoonful (containing 0.5 stovarsol) is applied two or three times a week; irrigation is to be avoided. The third or fourth application will usually render the secretion normal. In obstinate cases it may become necessary to repeat the treatment weekly. Recidives have been observed, but not until after several months. They might easily be explained as reinfestation from the rectum.

Trichomonads a Cause of Abortion

The author[4] proved conclusively by experiments that the trichomonads from the uterus of cattle will locate in healthy rabbits and guinea-pigs following artificial infection (subcutaneous, intramuscular, intraperitoneal, vaginal) and will prove pathogenic without the complication of other causes. When injected subcutaneously, the trichomonads will cause an extensive subcutaneous edema. When injected intraperitoneally, the result will be a severe purulent peritonitis whereby the flagellates can be demonstrated in the fetuses, in the fetal membranes, and in the uterine content of aborting mother-animals. In one guinea-pig abortion was produced solely by the vaginal

[1]Kotlan, A. 1933. Zur Kenntniss der Kokzidiose des Wassergerflügels. Die Kokzidiose der Hausgans. (Coccidiosis in the domestic goose.) *Zentralbl. f. Bakter.* etc. I. Orig. 129 (1/2) :11-21.

[2]Pederson, Carl S., Temperature Variations in Bacteriological Incubators. N. Y. State Agric. Exp. Sta. Tech. Bulletin No. 213.

[3]Gellhorn, G. 1933. Die Behandlung der Trichomonas-vaginitis mit Spirocid. (Treatment of trichomonas-vaginitis with Stovarsol.) *Zentralbl. f. Gynäkol.* 1933:1351-1352.

[4]Witte, J. 1933. Tierversuche zur Prüfung der Pathogenität der in den Genitalien des Rindes vorkommenden Trichomonaden. (Concerning the pathogenicity of the trichomonads occurring in the genitals of cattle.) *Arch. Tierheilk.* 66:333-343.

infection; the trichomonads were afterwards demonstrated in the fetuses. The young of another guinea-pig, likewise infected vaginally, died up to the age of 36 days showing marked anatomical lesions which were produced by trichomonads and which had to be considered as the cause of death. The trichomonads must therefore be regarded as pathogenic. Enrichment of trichomonads in blood-bouillon facilitates the demonstration of trichomonads when the microscopical examination should prove negative.

Bang Infection in Dogs

Among 58 dogs from farms on which chronic infectious abortion occurred, nine were found[5] to exhibit a positive Bang agglutination, and nineteen a positive complement fixation; eight dogs showed a positive agglutination and complement fixation reaction. The cultural examination of the urine of nine serologically Bang-positive dogs was negative in all cases. Three dogs infected intravenously, subcutaneously, and perorally with cultures of Brucella abortus, exhibited an undulating type of fever during the following months without showing diagnostically visible symptoms of disease. The autopsy of two of them revealed multiple miliary to submiliary yellowish nodules in the kidneys, especially in the immediate neighborhood of the renal capsule. The dog which was injected intravenously, harbored abortus bacteria in the urine as late as 33 days after infection.

Bang Organisms Cause Allergic Reaction in Veterinarian[6]

A veterinarian, 40 years of age suffered from a severe dermatitis on both arms. Antiseptics which were originally suspected as the cause, could be eliminated. By careful auto-observation the patient found that the dermatitis was caused from the contact with the vaginal mucosa of aborting cows. A severe itching ensued 30 minutes following the contact, and 24 hours later the dermatitis made its appearance. The exciting cause was found to be the vaginal discharge of the cows, heavily charged with Bang-bacteria. In the absence of other symptoms of a Bang bacteria infection in the patient, and with the agglutination titer being negative, the dermatitis was considered as an allergic reaction produced by the repeated exposure to the germs. Recovery took place in 14 days after applications with 0.5% aluminum acetate solution.

Allergic Reaction in Trichinosis

The intradermal skin reaction produced by the use of trichina antigen is to be considered specific in trichinosis. This fact has been established by the author[7] in experiments on 23 men, 14 guinea-pigs, 44 rabbits, and 12 hogs. There are from one to two phases to the intradermal skin reaction. As a rule two phases (rarely one) are observed in man. The first phase consists of an edematous urticaria-formation which reaches its maximum within nine hours after the antigen injection. The second phase consists of an infiltration reaching its maximum within 24 to 28 hours after injection; it terminates after 40 to 52 hours. In guinea-pigs and rabbits, the intradermal skin reaction will show one phase in the initial stage of trichinosis, but two phases in the later stages. In hogs, one phase is the rule for the reaction. Infiltration takes place already at the time of the first urticaria formation; the presence of the urticaria obscures the zone of infiltration. In the early stages of infection, the reaction consists usually of one phase of short duration; in the later stages of infection (above 30 days) the reaction will consist of two phases of longer duration. The intradermal skin reaction gives positive results in trichinosis as early as the fifth day of infection. The character of the intradermal skin reaction depends on the duration of the infection, the concentration of the antigen, the structure of the skin, and probably on the intensity of the infection.

[5] Thomsen, A. 1932. Brucella infection in dogs (transl. title). Medlemsblad f. d. Danske Dyrlaegeforening 15(22). (Abstr. *Zentralbl. f. Bakt.* etc. I. R. 110:353.)

[6] Weber, L. P. 1932. Brucella dermatitis. *Arch. Dermat.* 26:422-424.

[7] Maternococska, J. 1933. Intradermale Hautreaktion bei Trichinose. (Intradermal Skin-reaction in trichinosis.) *Zentralbl. f. Bakt.* etc. I. O. 129 (3/4):284-301.

Symptomless Anthrax Infections of Man

Man may become infected with anthrax[8] without showing symptoms. In some of these cases it is possible to demonstrate anthrax-antigen in the blood by the aid of precipitation reaction, but only during the course of the infection. After reconvalescence the antigen disappears from the blood. Judging from the findings of the author one may assume that the clinical type of anthrax resulting in recognition is far more rare than the symptomless type. In his experiments the author neglected to examine the persons who reacted positively to the precipitin reaction for the possibility of finding bacillary carriers. The author deems it expedient to call the attention of epidemiologists to the fact that symptomless anthrax is likely to exist then, when conditions are present which enable an entire group of persons to become infected simultaneously. Such cases should be studied in order to solve the question whether anthrax bacteria are discharged in these cases or not. This question is of utmost epidemiological importance. The author considers his case of a patient who ate anthrax-infected meat, not as an exception, but as the rule, and concludes from his observation that symptomless infections do occur quite often in anthrax.

Blood Changes in Rabies

Of ten cases of natural rabies[9] in dogs, seven exhibited a hyperleucocytosis, aneosinophilia, neutrophilia with a shift to the left, lymphocytopenia, and monocytopenia. The number of leucocytes may be normal or even below normal, but even then there exists a neutrophilia with more or less shift to the left and lymphopenia. The Schilling hemogram may become useful in the diagnosis of rabies as soon as it will be possible to exclude all those diseases which influence the blood picture in a similar manner.

[8]Sinai, G. J. 1933. Symptomlose Milzbrandinfektion beim Menschen. (Anthrax in man without symptoms.) Zeitschr. f. *Immunitätsforschung und exp. Therapie* 79 (3/4) :199.

[9]Natscheff, B. 1933. Das weisse Blutbild im Sinne von Schilling bei der Tollwut des Hundes. (Schilling's haemogram in canine rabies.) *Wiener Tierärztl. Monatschr.* 20:105-111.

Differentiation of Gallinarum and Pullorum Types of Salmonella

The examinations[10] were carried out with 47 pullorum and gallinarum types for the purpose of finding differential characteristics for type differentiation. It was found that dulcit can be used for differential diagnosis; pullorum types will not act upon it, while gallinarum types will produce acid in it. Litmus milk seems to possess a similar diagnostic accuracy; gallinarum types will cause a color reduction to blue. Other aids are maltose which practically is not acted upon by pullorum types; and the Gassner plate, in which the gallinarum types will not produce a faint or green growth. Serologically and in animal experimentation they fail to show type differences.

Experimental Immunization With B. Pullorum

Rabbits[11] immunised parenterally with killed pullorum cultures exhibited in their sera distinct agglutinins against typhus bacteria and *B. pullorum*. In these immune sera the bactericidal action against typhus bacteria increased visibly, but it did not increase against B. pullorum. Oral vaccination of rabbits with pullorum cultures killed by heating is harmless. Rabbits fed three times daily with 20 milligrams of microbes gained more or less in weight.

Etiology of Swine-flu

In his investigations into the causes for runtings in pigs, the author[12] enountered the virus of hog-cholera in a few cases. He does not attribute much importance to the lack of sanitation, usually given prominence

[10]Günther, K. 1933. Vergleichende Untersuchungen über das B. pullorum Rettger (1909) and das B. gallinarum Klein (1889.) (Comparison of Salmonella pullorum and S. gallinarum.) *Zentralbl. f. Bakt.* etc. I. O. 128:197-204.

[11]Okubo, K. 1933. Experimentelle Studien über die perorale Immunisierung mit Bact. pullorum. (Experimental peroral immunisation with B. pullorum.) *Zentralbl. f. Bakt.* etc. I. O. 129 (5/6) :350-365.

[12]Koebe, K. 1933. Die Aetiologie der Ferkelgrippe. (Etiology of swine-flu.) *Zentralbl. f. Bakt.* etc. I. O. 129 (3/4) :161-176.

in discussions. He found a hemoglobinophile bacterium which he called *Bacterium influencae suis* in cases of the so-called enzootic pneumonia of pigs. This germ proved to be pathogenic when introduced subcutaneously, intravenously, intrapulmonary, and intranasally. He demonstrated also the presence of a virus which is not identical with the virus of hog-cholera; it has much similarity with the virus of hog-flu demonstrated by Shope. This virus, together with *B. influencae suit,* produces a disease of which the main symptom is a pneumonia of an enzootic character. The virus alone may cause disturbance of the health and may even prove fatal without producing anatomical lesions.

Group-Specific Differentiation of Equine Blood

The investigations[13] into the side-groups of the horse led to following results: It was found that there are differences within the characterpair A-alpha. Besides a supersensitive A (A_1) there occurs an infra-sensitive type A_2, and likewise a super-active alpha is accompanied by an infra-active alpha-prime. If in the agglutination test blood corpuscles A_2 meet with alpha-prime agglutinins, then, very frequpently, clumping will not take place. When the sera are concentrated by means of freezing, these deficiencies may be eliminated. The agglutinin alpha-prime is possessed by 7.5% of the side-group bloods, in addition to the blood corpuscles A_2. The structure A-alpha in the same blood, seemingly unphysiological, is in reality A_2-alpha-prime, and therefore physiological. In the equine blood four new character pairs were demonstrated: X-x, Y-y, Z-z, and V-v. Excepting the character pair V-v, the reactions were extremely energetic, and agglutination took place. On the basis of this new division, all side-groups are eliminated. The similarity of the blood group relationship between man and horse is mentioned.

[13]Schermer, S. and Kaempffer, A. 1933. Weitere gruppenspezifische. Differenzierungen im Pferdeblut. (Group-specific differentiation of equine blood.) *Zeitschr. f. Immunitätsforschung u. exp. Ther.* 80(1/2):146-171.

Miss Connie Johnston, first woman student in the School of Veterinary Medicine, University of Pennsylvania. Miss Johnston, Vassar student and graduate of University of Minnesota, has traveled in Europe, Africa and India.

Jewish Students Start Veterinary Honorary Society

New fraternity, named Sigma Iota Zeta, first of its kind in United States.

Jewish students in the College of Veterinary Medicine have organized a professional fraternity which has been officially recognized as a campus organization.[14]

The fraternity formed last week, has been named Sigma Iota Zeta. It is the first of its kind in the United States.

Charter members and officers in the organization are: Joseph D. Kresewitz, president; Emanuel Silverstein, vice president; Leo L. Lieberman, secretary; Meyer Berliner, treasurer; Max Cohen, sergeant-at-arms; Solomon Mirin, Harry Sinai, Joseph B. Moscowitz, Alexander Greenfield, and Albert Glassman.

[14]*Ohio State Lantern.*

Development of Veterinary Medicine in North America

By D. M. CAMPBELL

I INTRODUCTION

Nothing can be completely understood if its history is unknown.—Major General Sir Frederick Smith.

IT IS notorious among the informed that, compared to its merits, veterinary medicine is least known and least appreciated among the professions and sciences and perhaps among industries, not only by the general public but by agriculture which in the main, it serves. Veterinary medicine in this country occupies a position subordinated below what its importance merits, or what its very material achievement justifies. Such has been the case for at least half a century.

The causes for this unfortunate condition probably do not lie wholly within its development on this continent, but in some measure extend back to the genesis of veterinary science in England, nearly a century and a half ago. In the main, however, the responsibility for the present position of veterinary medicine in our social, economic and governmental organization rests within and without the profession in this country.

TO SHIFT such of the blame as we may to others, we invoke the aid of General Smith, veterinary historian. It will be recalled that Charles Vial, a Frenchman, graduate of the Veterinary School at Lyons, and former instructor in both that school and the newer one at Alfort, went to London in 1788 and was largely responsible for the founding of the veterinary college at St. Pancras (then three-quarters of a mile north of London), the first veterinary college in England. It was founded in 1791 just 29 years after the founding of the school at Lyons, the first such institution anywhere. Vial (or St. Bel or Sainbel, as he was often called since he came from the district of St. Bel, France and often signed himself Vial de St. Bel.) was made head or professor of the new institution and began his course of lectures in 1792. The course was of three years or three terms duration. It was strongly supported by John Hunter, the leading surgeon in London at that time and by the medical profession generally. It was a thoroughly high-class institution for the training of educated, professional men. Unquestionably had Charles Vial lived out his normal expectancy, graduates of his school would have ranked socially and professionally with the best class of medical men. He asked for the best type of man to be educated as a veterinary practitioner. He regarded that as the pivot (and rightly so) upon which the whole future of the veterinary profession rested.

Charles Vial died of glanders (August, 1793) within a year of the opening of the college and a few months later John Hunter, the most influential supporter of Vial's policies also died. He was succeeded by Edward Coleman (February 17, 1794) and the three-year course of instruction was reduced to three months! Coleman was not a veterinarian, had never attended a sick animal in his life and possessed no knowledge of veterinary science. General Smith draws the conclusion that one reason for reducing the course of instruction to a few months was his despair of concealing his ignorance

from his students for a longer period; that he opposed educated men as students because they were inclined to ask the reason why, and of course Coleman could not answer, and that he opposed medical students because they were able to see through his shallow, fatuous system and to criticize him. He desired no criticism; absolute submission to his authority and dogma were necessary and this he could get only from men without education or social position. "The real Coleman was scheming, grasping, selfish, a slave for pelf, jealous and vindictive. He amassed a fortune from his college connections and army contracts."

Coleman believed, or at least said, that the stable and forge supplied the best type of veterinary practitioner and the medical man or medical student the worst. He said he "preferred the sons of grooms and stablemen to the sons of gentlemen" for students and admitted also "linen drapers, paper hangers, shoemakers and tailors." In 1796, Coleman became in addition to head of the veterinary college, head of the veterinary service of the British army and continued to hold both positions, acknowledged head of the profession both civil and military till his death (1839), 43 years later. He ruled it with a rod of iron. His successor in the army (Cherry) stigmatized him as "the greatest enemy the veterinary profession ever had!" Again, General Smith says: "On joining the college, he (Coleman) found selected students who, socially, were as good, if not better, than the ordinary medical man, certainly better than the surgeon of the period. We have seen that for this superior class Coleman had a rooted antipathy; he appears to have considered that men of the lowest social status were good enough for the veterinary profession, that they should on no account aspire to rank socially equal with the medical profession . . . determined that the social status of the profession should not rank higher than that of the existing unqualified practitioner. . . . Year by year, the college was mainly filled with, what a writer of the period described, as *'canaille'* — grooms ostlers, farriers, country louts, and others of equally humble callings. There was no educational test and no weeding. . . . The effects of this were to handicap the profession for generations."

WHEN it is recalled that Coleman was succeeded at the London college by Wm. Sewell, his associate for 40 years and that the identical policies of Coleman were continued by his successor for another 14 years and in fact were not radically altered until 1871, it will be seen how firmly, how durably and tragically the inferior status of the profession was established in the minds of the public.

It must be realized in this connection that the vast influx of immigrants from various and sundry countries of Europe which resulted in America being termed a "melting pot" did not begin until long after the Civil War. During the Colonial period and for 75 years thereafter, our social and political customs, to what now seems a surprisingly large extent, were derived ready-formed from Great Britain and with them, the English view of the veterinary profession and the English prejudice against it. Our veterinary education system too was imported *en masse* from the older country, as will be seen later, but fortunately not from the London school which was still under the baneful influence of Coleman policies, but from the Edinburgh school (Smith, McEachran, Law, Lyman and others) which was, at that time, a far more progressive institution.

It will thus be seen that veterinary medicine got a bad start in this country, more than a hundred years ago, and that it was not the fault of the profession in this country nor of the public. It was, under the cirumstances, an inevitable importation. For that handicap only, can we evade responsibility; the remainder rests upon ourselves.

IT IS purposed to deal with the history of veterinary medicine in North America in a series of articles in this magazine, but no commitment is made as to their

regularity in appearance, their number or the period the record will include. The writer long ago learned the burden of preparing articles month after month on the same subject, in the face of fulltime employment on other matters. Furthermore, as General Smith, historian of the veterinary profession, has aptly said: "The unravelling of history is a slow process. Imagination cannot be substituted for facts, and facts have to be unearthed. This task is frequently laborious; *a week* may be spent in obtaining information capable of being expressed in *less than a line of print.*" While we shall probably not spend a week in the pursuit of a single elusive fact, neither shall we substitute imagination for it. In a discussion less formal than would be expected for publication in book form, less than completion may be tolerated provided an attempt at accuracy be made in that which is recorded.

A great advantage of publishing material of this kind in a series of magazine articles, rather than as a book lies in the opportunity afforded for correction of conclusions based upon inadequate facts and for overcoming the faults of omission. Magazine publication gives an immediate large distribution with a consequent wide opportunity for criticism and permits prompt correction in the same field, if inadvertently errors have crept in or ill-founded conclusions have been reached. It is hoped to take full advantage of this opportunity to improve the discussion as it progresses and all readers are invited to aid in its improvement by criticism of the installments as they appear.

THERE seems no disposition on the part of anyone to question that a history of veterinary medicine on this continent should be written or that it would be of practical usefulness to the profession if available. At the 14th (then called the 13th) annual meeting of the United States Veterinary Medical Association at Philadelphia in 1876, a paper was presented (by Liautard) giving a historical account of the profession in this country. At the 70th annual meeting of the A. V. M. A. in Chicago last summer, the subject of veterinary history was discussed in two papers. At the 52 annual meetings intervening between these two the same subject has received consideration frequently, as it has at numerous state veterinary association meetings. The A. V. M. A. has now and has had for about 20 years, a Committee on History, which during all this time has been collecting and compiling information of a historical nature for the use of the profession. That the average veterinarian is not satisfied with the amount of historical information concerning the profession he possesses, is indicated in part by the fact that no other single feature at the recent Chicago meeting engaged the prolonged interest or attracted as much attention as did the historical exhibit "A Century of Progress in Veterinary Medicine," described in the October issue of this magazine.

It is not the aim of the present writer to duplicate the work that others have done in this field, but rather to supplement it. A history of the Federal Bureau of Animal Industry having been published and a history of the veterinary service of the U. S. Army being now in preparation, these subjects will be discussed but briefly. However, the scope of veterinary activities practically untouched by the historical writers is large. Any connected story of veterinary education in North America remains untold as does the achievements in disease control in animals and veterinary accomplishments in public health work. Only contemporary appraisals of the more salient features of these subjects have been published and these lack the time perspective indispensable for evalution of their effects or importance. The record of veterinary research and improvements in the methods of preventing and treating disease is, if anything, more inadequate, while concerning veterinary medicine in Mexico and Cuba, hardly a word has been published in English. Of no veterinarian on this continent has a complete biography been published. Fifty veterinary schools have been estab-

lished and three-quarters of them have ceased to exist. There is no connected story of their objects, their ideals, their effects on the veterinary profession and on veterinary medicine or their careers. An equal number of veterinary periodicals have been started and the mortality has been even higher. Certainly far more than a hundred veterinary associations have been launched, some having an important influence on the trend of veterinary medicine, others being sterile. The A. V. M. A. has pursued widely differing objectives at different periods. Organized primarily to secure a better recognition for veterinary medicine in the United States Army, at times it has given the matter no consideration, at other periods this object has absorbed its main effort; at certain periods the association has been completely dominated by the schools, at others it has been their near master. The slow growth of laws regulating veterinary practice as they were enacted in state after state, until all were included, is worth recording with the names of those who promoted their enactment; the many modifications of these laws and their effect upon the profession is worth study.

D. Arthur Hughes, premier literatus the veterinary profession of this country has produced, wrote** on this subject more than 20 years ago in part as follows:

"The work [writing of "American Veterinary History"] deserves doing. It is easy to lay hold of established facts and apply them practically. But who were the men who turned theory into fact (who were the men that improved recognized surgical operations or developed new ones)? Who were the men who established the great veterinary truths; who discovered them; who were the men who, through sacrifice, made us the gainers? Infection, immunity, sera, these are easy words to understand today; but who established the facts about them in veterinary science? Who were the pioneers who started the colleges? Who pointed the ways for veterinary progress? Who quickened the veterinary conscience in the press and rebuked humbug in veterinary practice? Who were the men, strong in administrative gifts, who made the way for the upbuilding of a national system of control of animal disease? These, whoever they were, were some of the makers of veterinary science, were some of the makers of American veterinary history. . . . . .

"The function of the American veterinary historian is not to relate meaningless and inconsequential facts about ordinary experiences in this workaday world; nor, Boswell-like to set down idle talk of idle individuals which has no effect on veterinary progress, nor has lent any color to events. Ordinary and commonplace events in veterinary experience indicate nothing of what progress will be made. American veterinary history is the narrative of the course *important* events have taken in all things concerning the veterinary profession, since that branch of learning was introduced into America, which has made for the enlargement of the interests of the profession, to increase the bounds of its usefulness, and to give it a place among the learned professions.

"The narration may take many forms, phases, chapters. It may, in part or whole, be a narrative of the events in veterinary sanitary progress, national or state, from the beginning. It may be a narrative of the chief advances in all forms of investigation in veterinary sciences and the effects on veterinary progress. It may be an account of the progress in practical work, from the days of cow-leeches and the days when charlatanism reigned supreme everywhere, to the present. . . . . .

"American veterinary history has been made in the events which transpired since the beginning. Truthfully, that history includes everything good or bad done in a professional way by veterinarians—as citizens of specialized knowledge working in society. Hence it has its varying chapters. These chapters together constitute the range of our professional history.

. . . . . .

"For history, in any form, is taken up with men and events in their lives. The stream of events, which compose the material of historical narration, is often enough directed in its course by movements, and these are begotten by, encouraged and made purposeful, by leaders of men.

. . . . . .

"The evidence, which constitutes the materials out of which our history is to be written, is almost bewildering in its variety. Yet all evidence must be consulted, and the judgment of the writer exercised upon the trustworthiness of the materials.

"Of such material is the profusion of national veterinary literature—all that has come from the government printing office touching veterinary science—annual reports, special reports, bulletins, circulars, tables of figures on animal industry, maps, leaflets, even the orders of administrative officers. Any or all of this, part of which to some may appear trifles, may be valuable data for the historian of veterinary progress in this land. Again the veterinary literature of all sorts issued by the states—the laws, regulations and ordinances, the manifestos and decrees, are of the greatest worth to indicate to the veterinary historian the way events are going, or rather have gone, in the different sections of the country.

**Hughes, D. Arthur, Litt. M., Ph.D., D.V.M.; American Veterinary History—Its Meaning and Its Scope. American Veterinary Review, Vol. 39, No. 2, May, 1911.

"Furthermore, the records of veterinarians as leaders in all the more unofficial walks of life—veterinary materials of all forms issued from the press; our scientific periodicals, whether the magazine still is being issued or is defunct; sporadic essays appearing in popular magazines, or the daily press, or in the scientific press other than our own; the publications of all sorts of the American Veterinary Medical Association, or the United States Veterinary Medical Association, even the unpublished records of the veterinary associations, national, state, or local—all these are indices to the historian of veterinary advancement. The veterinary publications of all sorts and classes, whatever leaves the printing press in any way concerned with our work, as well as all unpublished records, constitute our veterinary archives. They should all be guarded and preserved as memorials of a reverenced past.

"Moreover, biography, autobiography and letters, journals and records of personal work of every kind, which is of the best professional service, are priceless materials for the historian who is to work upon them when the maker of personal record is gone. Such personalia as painted portraits, busts, photographs, photogravures, electrotypes, which are the artistic expression of personal appearance, have an increasing value to the historian as time goes on.

THIS long quotation from Doctor Hughes is given because he had given the matter of a record of the development of veterinary medicine in America much thought and was qualified to write authoritatively upon the subject. Within four years after the foregoing was written, Doctor Hughes planned a series of articles on veterinary history for publication in this magazine, to be later arranged for publication in book form. His untimely death soon afterward wrote finis to the project. It is unlikely that our generation will see another so thoroughly qualified to undertake this important work.

It is the present plan to divide this subject into six periods:

1790-1850—The "dark ages."
1851-1880—A period of revolutionary changes.
1881-1900—A period dominated by the schools.
1901-1916—A period characterized by rising standards of education and practice.
1917-1920—The war period.
1921-1934—A period of conflict with organized agriculture.

There is no undertaking however, that the foregoing plan will be followed rigidly or completed in its entirety. To collect the material necessary for the compilation of such a record will require the cooperation of many; cooperation which may not materialize to the extent desired. For the periods following 1880 much material is available; one or more veterinary periodicals have been published regularly throughout these periods, and it is chiefly in its professional magazines that the record of any profession is to be found. For the periods prior to 1880, however, other sources, chiefly farm publications, veterinary books and government reports, must be relied upon. Not all of this material is available in any one library or to be found in any one city or state. The comprehensiveness of this part of the story must depend, in no small degree, upon the willingness of all members of the profession to supply such of this material as may be available to them.

Readers are requested to send in a list of any of the following in their possession or obtainable by them:

1. Books and pamphlets published in this country prior to 1880, dealing with the diseases of animals and/or their treatment.

2. Copies of the American Veterinary Journal (Published in Boston 1851-2 and 1855-8).

3. Farm, livestock, turf, field and horseshoers' publications, published prior to 1880 and containing veterinary departments or discussions of animal diseases.

4. Patent office or other government reports issued prior to 1880 and dealing with diseases of domestic animals.

5. Any other published material including obituaries that may have a bearing on veterinary activities prior to 1880.

Since information of the periods subsequent to 1880 will be needed in time, it is suggested also that readers cooperate by listing in addition the following material, possessed, or obtainable, by them:

Copies of *The Veterinary Gazette* (published in New York City in the 80's); *The United States Veterinary Journal* (published in Chicago in the 80's); The *International Veterinary Review* (published in Grand Rapids, Michigan); The *Western Veterinary Journal;* The *Veterinary Magazine* (published in the 90's) and other American veterinary periodicals not now published excepting the *American Veterinary Review* of which only volumes 9, 10 and 11 are desired.

Let's go!

The Veterinarian and Human Health*

By R. R. DYKSTRA,
Manhattan, Kansas

MANY of my listeners doubtless are busy people, concerned as good people should be with their own affairs, and therefore having but little time or opportunity to remain fully familiar with life's various vocations. A brief word of explanation therefore in regard to the veterinarian and his training will probably not be out of place.

The sole conception of a veterinarian still held by many people is that he is the person to call when an animal is sick. Formerly the veterinarian's duties were limited almost exclusively to the treatment of animal diseases. As time has gone on the veterinarian has found that his field of endeavor has gradually become enlarged, so that while his principle work still is the handling of ailments of animals he has become also a sanitarian, in which capacity he inspects animal food products, certifies to their wholesomeness, and by stamping out certain animal diseases communicable from animals to man in a measure becomes a guardian of human health.

From the educational standpoint, what is a veterinarian? There are in North America at the present time thirteen colleges of Veterinary Medicine—eleven of them being in the United States—and all are parts of state colleges or universities. Before a person is eligible to enroll in one of these colleges of veterinary medicine he must have completed a four-year course in a high school, then he must complete at least one year of college work of a general science nature, after which he may be admitted as a freshman student in the regular four-year curriculum in veterinary medicine. During these four years the student is trained in the underlying principles of veterinary medicine and also receives thorough instruction in bacteriology, chemistry, pathology, animal diseases, meat, milk, and food inspection, and in fact in all subjects pertaining to the broad science of veterinary medicine. In the few remarks that are to follow then, and when using the term veterinarian, I have in mind a person who has completed his training in one of our American veterinary colleges.

What, now, does this veterinarian do in protecting human health, this being the subject of my discourse. I shall take this opportunity to mention just a few of the veterinary activities in this respect.

There is a disease of dogs, primarily, though some other animals also may contract it, which is known as rabies, or people usually speak of it as "dog madness." A human being bitten by an animal having this disease is likely to contract it because the saliva of the diseased dog carries the infectious principle. Those at all familiar with this disease know the horrible death it produces. Fortunately there is usually an interval of several days from the time of the bite until the symptoms begin to develop in the bitten person. The bites of many dogs, from the standpoint of rabies, are quite harmless because only comparatively few dogs have the disease, but the disease cannot always be recognized from outward symptoms. A person, therefore, who has been bitten, wants to know whether or not the bite is likely to prove serious. The veterinarian steps in here, and by an examination of the animal or by a laboratory examination of the brain of the dog if it has already been killed, he can state positively whether or not the bite of that particular animal is infectious.

A veterinarian, therefore, should be consulted at once, the dog should not be destroyed, the veterinarian should be given a careful history of the case. He may then observe the animal for a few days and if it shows no symptoms in the course of ten days it may be said that its bite was not infectious; though on the other hand if the animal develops symptoms a brain examination under a microscope will usually be conclusive. These brain examinations by veterinarians have saved many people from needless worry, and still more important, they have saved the lives of men and children from a horrible death, by advising them to submit to early medical and Pasteur preventive treatment.

A second example, and a very important one, of the work the veterinarian is doing to conserve human health is in the program that is now being carried on to stamp out animal tuberculosis. So much has been written about this disease that most people are more or less familiar with it. It may affect any organ of the body, though many times it settles in the lungs in human beings and is then known as consumption. It has been definitely established that when dairy cows are affected with tuberculosis—and outwardly these animals may appear to be in perfect physical condition—their milk when consumed by people, and especially by children, may produce in the latter various types of tuberculosis such as that known as scrofula and joint and intestinal tuberculosis. Many of the larger communities in the United States have city ordinances providing that milk may not be sold to its inhabitants unless the health of the animals producing it has been certified to by a graduate in Veterinary Medicine. Not only this, but at the present time in the United States veterinarians are making a determined effort to stamp out tuberculosis in all cattle. This is a measure of great economic importance, but it is of still greater significance in controlling that phase of human tuberculosis contracted by drinking milk from tuberculous cows. In a recent public address

*Radio address delivered at Atlanta, Ga., Aug. 24, 1932.

a professor of medicine, who at the same time is the head of a large institution for tuberculous children, stated as follows:

"Children face the danger of active bone and joint infection and this is very likely to cause permanent deformity. In areas where cattle tuberculosis eradication has been effective for a year or two one rarely sees new cases of deforming types of tuberculosis in children."

This statement by one of our foremost physicians, more than anything else, indicates what the veterinarian is doing in this respect for human health.

Permit me to cite one more important function of the veterinarian in protecting human health. There is a law in force in the United States which in general terms states that all meat food products shipped from one state into another must be derived from animals that are entirely free from disease as certified to by an United States veterinary meat inspector. Before animals are slaughtered they are given a thorough veterinary examination, and again immediately after slaughter they are given a most minute examination; and if after these thorough veterinary examinations they are found to be free from disease they are given the government stamp "U. S. inspected and passed" and are permitted to enter interstate traffic. During the year ending June 30, 1931, federal veterinarians passed on approximately seventy-four and one-half millions of animals, the meat of which was used for human consumption. In this large number of animals it is estimated that veterinarians detected enough diseased animals to supply more than a half million people with meat at the present yearly per capita consumption. Unfortunately, Federal veterinary meat inspection is applied to only approximately two-thirds of the total amount of meat consumed in the United States. This leaves approximately one-third of the domestic meat supply without this inspection.

I can not at this time forego mentioning two additional contributions of veterinary medicine to human health. The first of these is that the human treatment of hookworm disease is the result of research work by a veterinarian. This undoubtedly is one of the leading medical discoveries of recent times. The second is the discovery made by veterinarians many years ago that Texas Fever or southern cattle fever is carried from diseased to healthy cattle by means of the cattle tick. This was the first time in medical history that it was definitely determined that an insect could carry disease from animal to animal, and this important discovery was the basis for the later discovery that malaria, yellow fever and some other diseases also are insect borne, and permitted human sanitarians to control these very serious human plagues.

The few instances cited of the relationship of the veterinarian of today to human health I believe are sufficient to warrant every sound thinking person to encourage in your local communities the activities of the graduate in Veterinary Medicine.

DO YOU REMEMBER?

1. Question: Of what importance is the foramen ovale (of the heart) in the newborn?

Answer: The foramen ovale is an opening between the right and left atria in the fetus. If this fails to close, or is imperfectly closed after birth, the visible mucous membranes become cyanotic due to the venous blood being mixed with arterial blood in the heart. This may result in death.

2. Q: Name the cartilages of the larynx.

A: The cartilages of the larynx consist of the epiglottis, thyroid and cricoid cartilages which are single, and the arytenoid cartilages which are paired. In the dog there is in addition an interarytenoid cartilage.

3. Q: Which blood vessel is chiefly concerned in a blood spavin?

A: A blood spavin is a distention of the saphenous vein in the region of the hock; other veins in that region are frequently distended at the same time.

4. Q: What is the number of each kind of permanent teeth, or the "dental formula" of the horse? mare? ox? sheep? pig? dog?

A: The dental formula of the horse is: 2 (I 3/3, C 1/1, P 3 or 4/3, M 3/3)—40 or 42; of the mare is 2 (I 3/3, C 0/0, P 3 or 4/3, M 3/3)—36 or 38; of the ox and sheep is 2 (I 0/4, P 3/3, M 3/3)—32; of the pig is 2 (I 3/3, C 1/1, P 4/4, M 3/3)—44; and of the dog is 2 (I 3/3, C 1/1, P 4/4, M 2/3)—42. In these formulae, I designates the incisors, C the canine teeth, P the premolars and M the molars.

5. Q: What are the chief differences in the ossa coxarum of the mare and stallion.

A. In the mare the diameter of the pelvic inlet is greater than that of the stallion, and is nearly circular, while that of the stallion is flattened transversely; the pelvic inclination is greater in the mare than in the stallion; the floor of the pelvis in the mare is smooth and generally concave while in the stallion it is rough and somewhat convex; the anterior border of the floor is also thicker in the stallion than in the mare; and the obturator foramini are comparatively larger in the mare than in the stallion.

Akron, Ohio. Wesley O. Keefer,

LIVESTOCK DISEASES BEING CONQUERED*

In its activities to improve the health of livestock, veterinarians of the Bureau of Animal Industry and cooperating states applied the tuberculin test to more than 13,500,000 cattle during the year. The testing of cattle in Nevada, New Hampshire and Utah was successfully completed during the year and these states were officially designated as modified accredited areas, signifying the practical eradication of bovine tuberculosis. At the close of the fiscal year eleven entire states had attained this distinction. The tuberculosis-eradication program has been extended also to freeing swine and poultry of this disease.

Investigations concerning infectious abortion, a malady from which stock owners have long sought relief, provided additional evidence to prove that the causal micro-organism may enter the body through the skin whether it is intact or abraded, but particularly if abraded. Vaccination of susceptible animals during calfhood gives promise of greatly increasing their resistance and thus serving as at least a partial insurance against the disease, and also in dealing with the malady in herds in which it is impractical to control it by blood testing and the elimination or segregation of reacting animals.

As a more efficient means of coping with swine erysipelas, a disease similar in some respects to hog cholera, bureau investigators have developed a rapid, whole-blood agglutination test by which the disease may be diagnosed positively. The method is similar to that used in poultry flocks in testing for pullorum disease.

Intensive studies of infectious equine encephalomyelitis, a comparatively new disease of horses, confirmed the belief that the infection is caused by a filterable virus. The use of an anti-serum in some of the western states has been effective in developing immunity in susceptible horses.

Studies of methods for controlling kidney worms and other internal parasites of swine in the southern states resulted in a simplified sanitary procedure designed to prevent infestation. In this work it was found that losses from kidney worms can be practically eliminated in growing pigs. Another investigation showed that carbon disulphide may be used as a satisfactory treatment for the removal of stomach worms in pigs.

The discovery that the common horse bot reaches the stomach of the horse in from 21 to 28 days after the larvae are taken into the mouth throws new light on the control of this parasite. In view of this new information horses may be treated successfully about a month after the disappearance of the adult flies in the fall. As a precaution against reinfestation from botfly eggs on the hair coat, the horses should have their legs washed with suitable disinfectants.

The essential facts on these and related activities have been made available to the public in new and revised publications, of which 63 were prepared by Bureau of Animal Industry specialists during the last fiscal year.

*From the Annual Report of the Chief of the Bureau of Animal Industry, U. S. Department of Agriculture, for the fiscal year ending June 30, 1933.

J. N. HUFF SUCCUMBS TO OPERATION

Joseph Neal Huff, age 43, president of the Colorado Serum Company, Denver, died October 22, 1933, as a result of complications following an operation for appendicitis.

Doctor Huff was one of five brothers, three of whom—T. B. Huff, president of the American Serum Company, Sioux City, and L. B. Huff, president of the Aurora Serum Company, Aurora, Illinois, and the deceased—were pioneers in the serum industry.

In addition to his four brothers, two of whom are veterinarians, Doctor Huff is survived by his widow, Mrs. Mabel Huff; one son, Majon, a student at Northwestern University; and his mother, Mrs. A. B. Huff. The deceased was a member of the American Veterinary Medical Association and a Mason. Interment was at Fairmount Mausoleum, Denver.

The annual meeting of the Wisconsin Veterinary Medical Association will be held January 22-24, 1934. An effort will be made to make the meeting of particular interest to practitioners. Further, important matters of policy will be given consideration. Headquarters: Park Hotel, Madison, Wisconsin. A. N. Lawton, Brodhead, is President; B. A. Beach, University of Wisconsin, Madison, is secretary.

WEST TEXAS VETERINARIANS ORGANIZE

A group of veterinarians of West Texas, whose practice and conditions are essentially the same, met in Abilene, Texas, November 6, 1933, and organized the West Texas Veterinary Medical Association, after a discussion on ethics, which was the primary purpose of the meeting.

Fourteen attended, including: Drs. O. E. Wolf, Big Spring; O. W. Orson, Midland; W. T. Hardy, Sonora; Verne A. Scott, Stephenville; Oscar Stephenson, Sweetwater; C. W. Lindley, Abilene; R. L. Rogers, San Angelo; W. L. Northcutt, Breckenridge; A. T. Lindley, Winters; C. W. Dunn, Abilene; W. R. Sanderson, Brownwood; A. J. Lewis, Haskell; R. H. Hodges, Ranger, and Charles Koberg, Coleman.

Officers elected for the ensuing year are: Drs. C. W. Dunn, president, O. E. Wolf, vice president, and Chas. Koberg, secretary.

San Angelo was chosen for the next meeting, which was held December 11, 1933, with a clinic, reading of papers and a general social gathering.—Charles Koberg, Secretary.

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5—Bio-chemical studies prove high availability of the proteins.

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* These tests were conducted by the Research Staff of Mariner & Hoskins, Biologic Laboratories. The Mariner & Hoskins Laboratories is one of the oldest and most reliable research institutions in the world.

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The original draft of the assay, as used by the laboratories participating in the preparation of this standard, is also available through the Chairman of the U.S.P. Committee of Revision. Within a short time this assay and the revised text for Cod Liver Oil to be established by "Interim Revision" will be officially announced. This Revision will establish the new Vitamin A and Vitamin D potency for official Cod Liver Oil.

The Standard "Reference Oil," of known vitamin potency, is supplied in 30cc packages. One lot of the oil has been assayed for its Vitamin A potency, another lot for its Vitamin D activity. A nominal charge of $2.50 will be made for each 30cc package. These may be secured in individual packages or in any larger number desired, by addressing the Chairman of the U.S.P. Committee of Revision at 43rd Street and Woodland Avenue, Philadelphia, Pa.

WEST VIRGINIA ERADICATES BOVINE TUBERCULOSIS.

The entire State of West Virginia is now in the modified accredited area signifying its practical freedom from bovine tuberculosis. West Virginia thus becomes the thirteenth state to eradicate bovine tuberculosis, the others being North Carolina, Maine, Michigan, Indiana, Wisconsin, Ohio, Idaho, North Dakota, Nevada, New Hampshire, Utah and Kentucky.

Tuberculosis-eradication work was taken up in a limited way in West Virginia in 1919 and more actively about 1923. Good progress has been made since that time in spite of the difficulty of traveling over some of the mountainous parts of the state, and the fact that the herds of cattle were widely scattered.

The degree of infection of tuberculosis was slight in most of the 55 counties in the state. In a few the disease was more extensive, but through efforts by livestock owners, veterinary officials, and others cooperating in the work, bovine tuberculosis has been practically eradicated from the entire state.

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A VEST POCKET ESSAY ON STRANGE INTERLUDE

Most of us think a centipede with fallen arches has less trouble getting along than we do, and we yearn for the good old days. That was probably the period when Dad paid the bills, Mother did the cooking, and we had the fun. Yet, today the old scenic but dangerous curves and replacing the right angle turns and straight lines of the "boyish bob" era. "Every day in every way, I'm getting better and better," is becoming a national chant again. No longer is money flippantly called "chicken feed," "mazuma," "bucks" or "jack." In fact, some folks get peevish when coin of the realm is called funny names or spoken of with disrespect. A skirt is now a noun instead of an abbreviation, and the wearer is no longer a chicken, flapper, or moll, but a girl or a lady. "Yes, we have no bananas" is a weird dream of the past, a "Technocrat" is only a name, and the blattant "Oh Yeah!" is fast fading. Men are again scratching regular matches on the seat of their pants and smoking "barnyard meerschaums" instead of tailor-made coffin nails. In many towns, the old street cleaner is back on the job, making the rounds of the hitching posts that were parking spaces before. Buying things we didn't need with money we didn't have is a past indiscretion. Since our boom era backfired on us, our burned fingers have slowly healed; our seared eyes are less cocked and soon our cracked lips will permit a happy grin without pain. It was a strange interlude of dippy, delightful, delirium—but what a headache it left.

We are relearning that opportunity knocks; it doesn't drive up, honk and invite the whole family for a joy ride, expenses paid. Many swine producers have disregarded the knocking of an opportunity to increase profits by reducing death losses. Frequently a mother and her litter are barricaded in damp cold quarters where the young may freeze to death and the sow reduces her milk flow to a starvation ration. If she is on an unbalanced feed, she certainly can't rear young that grow into pork profits. Good care, proper feeding, and sane management of the sow and her young will often double the number of pigs weaned—at no extra cost. When past the dangers usual to little pigs, most hogs will take care of themselves and properly balance their own diet if allowed to. However, hog cholera, the big bad wolf of all little and big pigs must be prevented. In Maryland the feeding of cholera-infected pork scraps in kitchen refuse, the purchase of new stock, and roving sick hogs cause more than 90% of the outbreaks of this disease. Obviously, care will prevent most outbreaks. Failure to use sane sanitary precautions may cause a strange and disastrous interlude in the profits and meat house.

College Park, Maryland,

Mark Welsh,
Inspector in Charge of
hog cholera work.

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VETERINARIAN MURDERED

A. M. Clifford, Temple, Texas, was brutally murdered November 8, 1933. He was lured into the country on the pretense of treating a sick animal. His body was not found until a week later, in some weeds in a field near a well traveled road.

The murder seemed to be the culmination of an affair of several years' standing. The murderer was arrested and confessed. He stated that he told the veterinarian that the gate into the premises was wired shut and that they would have to crawl under the fence, and as the doctor got down to crawl under, he hit him on the head with the rear axle of a model T Ford.

Doctor Clifford was graduated from the Ontario Veterinary College and had practiced in Temple since 1910. He is survived by a brother and a sister. His wife died a few years ago.—T. O. Booth.

The drawing for the illustration on the inside back cover page of this issue was made by Mr. Philip Stone, son of Dr. W. J. Stone of Joplin, Missouri.

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1933 Christmas Annual (December issue) DOG WORLD covers entire dog field in reviews and data—50c. Can furnish any dog book desired. Judy Publishing Company, 3323 Michigan Blvd., Chicago, Ill.

SALESMEN WANTED: A well established veterinary pharmaceutical and biological house is planning considerable expansion after the first of the year, and would like to get in touch with some experienced salesmen. Address No. 996, care of VETERINARY MEDICINE.

WANTED: Experienced graduate veterinarian wants good location for general practice in Northwest, Washington or Oregon preferred. Will purchase practice or consider partnership, later purchasing full interest. Address No. 993, care of VETERINARY MEDICINE.

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WANTED: Copies of VETERINARY MEDICINE for the month December, 1932. Your subscription will be advanced two months for each magazine returned. VETERINARY MAGAZINE CORP., 75 E. Wacker Drive, Chicago, Ill.

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The annual meeting of the Colorado Veterinary Medical Association will be held January 18, 1934, at the Albany Hotel, Denver.—Floyd Cross, Fort Collins, Colo., Secretary.

T. L. Dardis, Stockton, California, died October 22, 1933, as a result of an automobile accident. The doctor was responding to an emergency call and collided with a large truck. He lived only a few hours after the accident. He is survived by his widow and family.

Mrs. Mabel M. Baker, aged 47, wife of Dr. F. J. Baker of Gouverneur, New York, died November 22, 1933. Mrs. Baker had been ill for some weeks, but pneumonia was the immediate cause of death. She is survived by Dr. Baker, two sons, a daughter, her father and two sisters.

S. K. Hazlet, aged 66, died at his home in Oelwein, Iowa, November 26, 1933. Doctor Hazlet had practiced in Oelwein since 1896. He had long been active in the Iowa Veterinary Medical Association and had served as its president and in many other capacities. He was also active in the Eastern Iowa Veterinary Association. He was a Member at Large of the City Council at the time of his death, which resulted from a cerebral hemorrhage occurring on October 17th.

He is survived by his widow, three daughters, two brothers and one sister.